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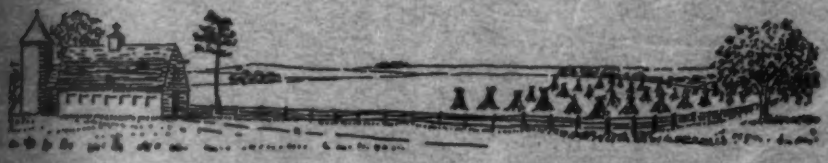

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Volume 6 December, 1942 Number 7

The Care of Electric Motors

Condensed from American Agriculturist

Forrest B. Wright

DUE to war conditions it is very difficult if not impossible to obtain a new motor for replacement no matter how necessary that motor may be. It is, therefore, highly important that the motors now in service be maintained in good working condition.

A motor really requires very little care. However, the care which it does require is absolutely essential. It takes only a minute or two for a mistreated motor to burn out and become useless.

As a guide to proper motor care the following points are suggested:

1. *Keep the motor bearings properly lubricated.*

Proper lubrication is just as important for electric motors as for any other machine. As a rule only the bearings on each end of the motor need lubrication. No single rule can be given for the lubrication of all types of motors, except that it should be done exactly according to the manufacturer's instructions. If these instructions are not furnished with the motor they should be obtained from the manufacturer or perhaps from some local dealer who is familiar with the motor in question. When writing to a manufacturer be sure to indicate the type of motor, the kind of current and voltage it runs on and the serial number. This information can usually be found on the name plate. Indicate also the use being made of the motor.

Too much oil on the bearings is almost as bad as not enough, because the excess oil only runs out and soaks into the coils and other working parts where it collects dirt and destroys insulation. Also as the oil dries out it leaves a gum on the motor parts which may interfere with their operation.

Avoid mounting a motor in a position where the oil will run out of the bearings. A motor designed to operate in a horizontal

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position should not be mounted on a vertical wall unless the end plates can be shifted to place the oil reservoirs horizontally. Neither should such a motor be mounted on end.

2. *Keep the motor clean and well ventilated.*

An electric motor, like a gasoline engine, generates heat when it is working. For cooling, a fan mounted on the shaft on the inside of the frame forces air to circulate through the motor. In time, the fan, the openings in the end plates and the air passages around the coils may become clogged with dust and lint so that the flow of air is greatly restricted. This has the same effect upon the motor as does a blanket on the radiator of a car. A motor in such a condition, fully loaded and run for any considerable length of time, is likely to overheat and burn out.

In addition to the restriction of air flow the accumulated dirt in the motor may work into the bearings causing excessive wear, or may even interfere with the operation of the starting mechanism. A periodic cleaning will eliminate these troubles.

To clean a motor (a) be sure that it is completely disconnected from the circuit (detach the cord or disconnect the wires from the motor), (b) remove the belt or otherwise disconnect the motor from the load, (c) take the motor apart by removing the end plates. As parts are removed from the motor mark them or observe carefully how they are assembled in order that they may be re-assembled correctly. (d) Dry-clean with rags or a dry paint brush as much of the dirt as possible and then wash the metal parts with cleaning fluid. Be sure that the air passages through the frame of the motor and through the rotor are clear. Do not apply cleaning fluid to the coils of the motor unless it is necessary to remove oily dirt because such solvents may damage the insulation on the wires. After washing, wipe the motor parts dry with a clean cloth, (e) while the motor is apart inspect the starting switch, commutator and brushes, if any, to see if they need repair, (f) re-assemble the motor, being sure that all parts go back in their correct positions. Tighten the end plate nuts, one after the other, and a little at a time, until all are brought down together. Be sure that the end plates fit tightly all the way around and that the shaft turns freely, (g) lubricate the bearings of the motor according to instructions, (h) reconnect the motor to the circuit and check its operation, (i) reconnect the motor to the load.

3. *Keep the commutator and brushes, if any, in good condition.*

Certain types of motors have

on the armature a cylinder or disc made up of copper bars interspaced with strips of mica. This is called the commutator. Riding on this commutator under spring pressure are two or more carbon brushes. Friction between the commutator and brushes wears the brushes and sometimes cuts a groove in the commutator. If the motor is allowed to become dirty this wear may be rapid enough to destroy the brushes in a short time. Badly worn brushes should be replaced with new ones. The brush guides should be clean and free from gum so that the brushes will be pressed firmly against the commutator by the brush springs.

If the commutator is worn it is likely that a condition known as "high mica" exists. That is, the copper sometimes wears faster than the mica leaving the mica projecting above the surface of the copper. This high mica prevents the brushes from making good contact with the copper and therefore interferes with the operation of the motor. This is usually accompanied by pronounced arcing at the brushes. When this condition exists the commutator should be turned down on a lathe and sanded until it is smooth. This is a particular job and should be done by an experienced person.

If the commutator is only slightly worn or slightly rough it can be smoothed down with fine sandpaper (at least 2/0). The best way to do this is to place the armature in a lathe and spin it against a strip of sandpaper held over the commutator. On some open end motors this can be done by holding the sandpaper against the commutator while the motor is running. Never use emery cloth on a commutator as the emery dust may short-circuit the copper bars.

4. *Do not overload a motor.*

A very common cause of burned out motors is overloading. If a motor is overloaded to the point where its speed is noticeably reduced it begins to draw an excessive amount of current which, in turn, generates excessive heat. The reduced speed of the motor decreases the effectiveness of the cooling fan and the temperature of the motor rises to a point where the insulation burns off the coils. When this happens the only remedy is to rewind the coils. At present it is very diffcult to obtain wire for rewinding. Do not expect a half horsepower motor to do the work of a three-quarter or one horsepower motor. Some types of motors have relatively low starting power and should not be called upon to start a full load. Washing machine and grinder motors are of this type. In such cases start the motor with as small a load as possible and apply the

main load after the motor has come up to speed.

5. *Overload Protection.*

Motors which may be subject to overloads or low voltage conditions should be equipped with special overload protective devices. This applies particularly to motors on automatic machines, such as milk coolers and water pumps and to motors on non-automatic machines which are operated without an attendant present, as is often the case with a milking machine. If something happens to stall or overload the motor on such machines the motor may burn out before anyone can reach it. The ordinary branch circuit fuse does not give adequate protection in such a case.

There are a number of inexpensive overload protective devices on the market which can readily be installed on motors now in service. These are, in general, of two types. One type is an automatic thermally operated switch which opens on overload and can be reset manually to reclose the circuit after the overload has been removed. The other is similar in appearance to a fuse but has special features designed for motor protection. These may be installed in place of the regular fuses in the motor circuit if there is no other device on the circuit, or on the motor itself. For portable motors and motors operated on the same circuit with other appliances, the protective device should be installed directly on the motor or on the appliance which it operates.

6. *Be sure that the motor is supplied with the proper voltage.*

If the voltage is too low the motor may stall and burn up. Low voltage conditions are common on farms where long circuits are involved. In many cases the load in a barn has been greatly increased since the wiring was originally done, until now the wires leading to the barn are, at times, overloaded. This causes a serious voltage drop. If two or three motors should be in operation at the same time they may easily overload the circuits. It is sometimes difficult for an inexperienced person to detect low voltage conditions. A good indication, however, is a noticeable and continued dimming of the lights when some additional load is turned on. Most power companies will send a man out on request to check the voltage. The voltage should be checked during a time when the load is likely to be heaviest.

The ultimate remedy for such low voltage conditions is to install larger wires to and in the buildings. A temporary remedy is to see that only a part of the electrical load is turned on at any one time. For example, the milk cooler and water heater could be

turned off while the milking machine is in operation.

7. *Keep the proper tension on the belt.*

If a belt is too tight, it will cause excessive wear on bearings, if too loose, it will slip and cause excessive wear on the belt. V belts need not be as tight as flat belts. Also the pulleys should be in line so that the belt runs straight.

8. *Miscellaneous.*

(a) *Bearings.* If bearings become worn, the rotor of the motor may be pulled out of line by the belt and caused to drag on the inside of the frame. This extra friction may overload or stall the motor. Bearings should be inspected occasionally for wear. A good time to do this is just before the motor is taken apart for cleaning. Pull back and forth on the pulley end of the shaft in line with the belt. If the bearing is worn the shaft will chuck in the bearing. End play in the shaft does no harm, in fact most motor rotors have considerable end play.

(b) *Moisture* is a natural enemy of motors. Avoid installing motors in damp places, if possible. If a motor should be flooded, do not try to start it until it has been thoroughly dried out.

(c) *Ventilation.* Be sure that air can circulate freely around a motor. If a motor is installed in a small tight compartment, or even in a very small room, the air surrounding the motor may become too hot for cooling.

(d) *Voltage Connections.* When installing a new motor or reconnecting one which has been removed, be sure that it is connected to the proper voltage and the proper kind of current. Some motors are built to operate on either 110 or 220 volts.

(e) *Radio Interference.* If a motor which normally does not give radio interference should develop such interference, look for loose connections in switch, fuse, splices or starting mechanism. Also inspect grounding connection, because static electricity may be generated by the belt and unless this is led off to the ground it very like will cause noises in the radio.

(f) *Shock.* If a shock is received when touching the motor, the field windings are probably grounded. Have this checked and repaired by a motor repair man.

(g) *Burned Out Motors.* In case a motor burns out, take it to a competent motor repair man for rewinding. He may, for a time at least, have a supply of wire on hand for this purpose. The job is too complicated for an amateur, or even some mechanics, to undertake successfully.

(h) *Cords.* Keep the cords on motors in good repair. Do not use small lamp cords to supply mo-

tors of one-eighth horsepower or larger. The larger the motor the larger the wires in the cord should be. Small cord wires often cause a serious voltage drop.

Bear in mind that an electric motor is a tireless, highly efficient and thoroughly dependable servant. The better you treat it the longer it will last.

Plowing Under Fertilizer

Condensed from New England Homestead

THE plowing under of fertilizers much as one would plow under manure is believed to have distinct advantages as a labor saving practice, and at the same time results in increased yields of vegetable crops. Evidence to support this view is offered by Prof. C. B. Sayre, head of the Division of Vegetable Crops at the State Experiment Station at Geneva, who has conducted experiments with deep plowing of fertilizers in the canning crops farm at the Station and in other sections of the State.

"An attachment to the plow by means of which fertilizers can be applied at the same time that the plowing is done saves considerable time in applying the fertilizer and at the same time places it where it can be used more effectively by the crops," says Professor Sayre. "Farmers have plowed under manure for years and know from experience that it is a good practice," he continues, "yet there are many who hesitate to plow under commercial fertilizers because they fear that the fertilizer will be lost by leaching. That this fear is unfounded is shown by the results of numerous experiments."

The fertilizer can be applied with a lime sower or fertilizer drill or broadcast by hand and then plowed under, but in the Station tests the best results have been obtained where the fertilizer is placed in the bottom of the furrow at time of plowing.

Among other advantages cited by Professor Sayre for plowing under fertilizers, especially with an attachment to the plow, is the placing of the fertilizer where it is more accessible to the roots and where it is less rapidly fixed in the soil and hence can be used more effectively by the crop, resulting in increased yields; avoiding danger of injury to roots from fertilizer "burning," an important factor with sensitive crops like beans, peas, and beets; completeing the job before the rush of work at planting time; and placing the fertilizer where it will enable plants to continue to grow during periods of drought.

Reprinted by permission from the New England Homestead, Oct. 17, 1942, Springfield, Mass.

Now That Every Bushel Counts!

Reprinted from Iowa Farm Economist

Walter W. Wilcox and Floyd Johnston

MORE milk has become the battle cry on the dairy front in recent months. We need more milk and milk products than ever before. We also need more meat, poultry and eggs. Grain supplies must be stretched to the limit to meet these demands. We can't afford to waste grain in feeding milk cows if it will produce more food when fed to hogs or poultry. Are you feeding your milk cows too much grain or too little?

That's a tough question. The U. S. Department of Agriculture set out to find the answer. Some 376 cows of known producing capacity were selected in nine states and fed varying amounts of grain over a three-year period. When the findings are applied to Iowa, it is clear that we should have produced much more than 263 million pounds of butterfat with the estimated 27 million bushels of corn and 29 million bushels of oats fed to our dairy cows last year. Here's the story.

After a certain point is reached in feeding grain to dairy cows, further feeding adds less and less to milk output. A man named Haecker studied this relationship at Minnesota some years ago. He determined how much feed was needed to maintain body weight and to keep a cow producing up to her inherent capacity. The findings have become known as Haecker feeding standards.

The U. S. D. A. study found that cows being fed 91 percent of this Haecker standard would produce an extra 128 pounds of milk when given another 100 pounds of grain — about 1.3 pounds of milk per pound of grain. But when the feeding level was stepped up to 138 percent of the standard, the last 100 pounds of grain produced only 45 pounds of milk—about 0.45 pounds of milk per pound of grain. These figures have meaning to Iowa farmers.

Iowa farm business association members last year fed an average of 2500 pounds of grain per cow to get an average production of 300 pounds of butterfat. (This is, roughly, equivalent to 8000 pounds of milk.) At this level of grain feeding, they would get around 75 pounds of milk from the last 100 pounds of grain fed. With grain at around 1½ cents a pound and butterfat at 42 cents

Reprinted from the Iowa Farm Economist, Sept., 1942, Ames, Iowa

(Aug. 15 average farm price in Iowa) the last 100 pounds of grain would be worth about $1.50 and the butterfat about $1.20 if we assume 3.8 milk. Clearly, this is a poor way to make money!

Contrast this return with that from grain fed to hogs in 1941. The average farm business association member produced 100 pounds of pork with 420 pounds of grain. With grain at $1.50 a hundredweight and hogs at $14.20 (Aug. 15 average farm price) a return of about $3.38 would be obtained from $1.50 worth of grain. Butterfat prices would have to more than double to equal this dollar return from the last 100 pounds of grain fed to hogs. (While gains per pound of feed fed to hogs also drop off as hogs become heavier, this is partly offset by the fact that the cost of keeping the breeding herd is spread over more pounds of pork.)

Moreover, if we take 100 pounds of grain from cows being fed 110 to 115 percent of the Haecker standard (about the feeding level of the average farm business association member) we reduce butter production about 3 pounds and lose about 70 pounds of skimmilk. This 100 pounds of grain fed to hogs on the average Iowa farm would yield about 15 pounds of pork and lard—a significant gain in edible food output.

There are two main reasons why grain is likely to be overfed to milk cows in Iowa. First, around 60 percent of the cows milked are not dairy type cows. They are not bred for dairy production. This means that a large part of the grain goes into flesh rather than into the milk pail. Second, many farmers feed grain heavily to make up for a lack of good legume hay and pasture. We can't do much now about the type of dairy cows we have, but we can change our feeding program.

Check over the roughages you are now feeding your milk cows. Do they get all the good alfalfa or clover hay they can eat? Are they on high quality pasture throughout the season? These should be the basic wartime rations for Iowa's milk cows. Too many farmers are overlooking the fact that good hay and pasture will make grain feeding unnecessary for many of their cows and will mean more profit for the feeder and more food for the nation.

One easy and fairly good guide for feeding milk cows is to check up on the butterfat sold last year. Take the grain away from cows producing 225 pounds of butter fat or less — feed them all the good legume hay and pasture they will eat. You should be able to produce up to 225 pounds of butterfat per cow without feeding

anything but legume roughage and pasture. Others are doing it. If you have only timothy hay and corn fodder, feed about 1 pound of oilmeal a day—do not feed corn or oats until cows give more than two gallons of milk a day.

But if your cows are bred for dairy production, full feeding of high quality roughage is not enough. Real dairy cows will make good use of 2½ pounds of grain for each gallon of milk produced. Feeding cows of this type too little grain cripples the war effort as much as feeding the low producing cows too much. Be sure that the grain ration is balanced with some protein feed, such as soybean meal. Millions of bushels of grain are wasted in feeding dairy cows too much corn and oats and too little protein.

Here's another problem. Many farmers are cutting down their dairy herds because labor is becoming very scarce, particularly good livestock men. Yet we need to hold dairy production at a high level to meet increasing war demands. What adjustment is best?

If you have help for milking, it seems wise to keep as many milk cows as you can grow legume hay and pasture for. Don't keep so many that you have to feed grain to make up for pasture and hay shortages. If you are cutting down because of short labor, remember that both hogs and chickens take work, and that with present livestock feeding rations you are passing up a chance for profit by failing to feed your grain.

What about buying feed grain? You can make both more money and food by buying grain now if: (1) you use it to push hogs to heavier weights, or (2) if it is fed to good, high-producing cows. Do not market light hogs or cut down on grain feeding of *good* dairy cows because you are short of grain—buy it!

Shipping Fever Cure

Johnson and Farquharson, of Colorado State College, report in the Journal of the A. V. M. A., that potassium guaiacol sulfonate effectively cures shipping fever of cattle. They report that nearly 100 per cent of cattle treated with guaiacol during the last 2 years recovered from the disease. The drug is best administered intravenously, they say. Diseased cattle treated with guaiacol at the college showed considerable improvement in 24 hours and returned to normal in 36 hours.

—*Missouri Ruralist*

Finishing Steers in the Feed Lot

Condensed from The Southern Planter

Dr. Fred H. Leinbach

University of Maryland

CATTLE feeders fall into two general groups, (1) those who run herds of breeding cows and who finish off the surplus cattle they produce, and (2) those who purchase feeder cattle to finish in the feed lot.

The cattleman who can efficiently produce his own feeder stock removes many of the uncertainties of steer feeding. The cost of his cattle into the feed lot is largely determined by his managerial ability and not by the law of supply and demand; the quality of his feeder cattle by the soundness of judgement he has exercised in building up the breeding herd. His feeder cattle are less apt to be affected by the so called shipping diseases, often the cause of considerable loss in purchased feeder cattle which have been shipped long distances. He has several choices in the manner of finishing the cattle; and he can determine in advance the market he will feed for. However, not all cattle feeders are in position to supply their own feeder stock and must rely on outside sources of supplies.

The object of finishing steers in the feed lot is to improve the quality of, and to add weight to, the original animals. In normal times, it will cost as much or more to put on 100 pounds of gain as will be received for 100 pounds of finished animal. If, however, the original poundage bought is improved sufficiently by the feeding process to sell for enough more than it cost, a profit from feeding results. This means that the cattle feeder must in normal times have a "margin" between his cost per pound and the subsequent selling price per pound. What this "necessary margin" will be depends on both the efficiency of the cattle and the ability and efficiency of the man in the feeding and handling of these same cattle.

The efficiency of purchased feeder cattle is difficult to measure in advance. It is determined pretty much by the kind of sires and dams which were mated to produce the cattle, and by the manner in which they have been nourished to the time they are placed on feed. Far too many feeder cattle on our markets are the result of mating knot-headed

Reprinted by permission from The Southern Planter, Oct., 1942, Richmond, Virginia

scrub bulls and cows together and the man who purchases this kind has minimumized his chances of success. A good rule to follow is to select only well grown, thrifty looking feeder cattle irrespective of age or grade.

The ability of the cattle feeder to get the maximum out of his cattle has much to do with his success. Proper balancing of feeds so that the ration fed is nutritionally complete is necessary for continued satisfactory gains. Since cost of gains is an important consideration, the ration fed must not only be nutritionally complete, but cheap in cost. Because corn silage is a cheap feed to produce, it has been widely used in steer fattening rations. Fed along with good legume or mixed legume hay as the roughage part of the ration, corn silage not only cheapens the cost of putting on gains but makes for greater gains. It may be satisfactorily used as the sole roughage feed for steers, provided it is properly supplemented with protein and lime, in which it is deficient.

In tests conducted at the Maryland Experiment Station during the winter of 1940-41, steer calves which were fed approximately equal amounts of corn silage and legume hay as the roughage part of their ration not only outgained steer calves fed a similar ration without corn silage, but were fatter when sold and had put on their gains at 55 cents less cost per hundred weight. This is a typical example of lowered feed costs brought about by the addition of silage to the ration.

Because of prejudice, many cattle feeders in the eastern area will not have hogs following behind the cattle they feed. Yet in the above mentioned tests the net value of pork produced figured at an actual average selling price of $10.22 per cwt was $5.49 per steer. This in itself is an item of considerable importance and may represent the difference between profit and loss on the feeding operations in some years. Grinding the corn fed in the ration will reduce the amount which passes through undigested, but does not entirely eliminate this loss. It is ordinarily better economy to feed the corn in the ration as broken ear corn, or shelled corn and follow the steers with pigs than to grind the corn regardless of whether or not pigs follow the steers. However, if no hogs are to follow the steers, it will pay to grind the corn. If barley is fed it will pay to crush or coarsely grind it and to have pigs follow the steers.

Many steers on feed are housed too closely. Cattle sheds with open fronts to the south and closed on the other side will provide ample protection for fattening cattle. The sheds and pens

should be located on a high, well drained area, and should be kept clean and well bedded.

The grade and age of cattle to be purchased for feeding should be determined by (1) the kind and amounts of feeds available, (2) the length of the feeding period, (3) the relative cost of different grades of feeder cattle, (4) the relative cost of different ages of feeder cattle of similar grades, and (5) the demands of the market on which the cattle will be sold.

Older cattle are more satifactory to use than calves, if the feeding period is to be of only a few months duration. Again, older cattle are preferred to either calves or yearlings, if there is a great deal of roughage feed to be disposed of. They also utilize poorer quality feeds—either roughages, or grains. Calves should not be fed unless the feed available is of good quality and unless a long feeding period is contemplated.

The length of the feeding period will also be determined to considerable extent by the grade of the cattle to be fed. The cost of 100 pounds of gain will increase as the feeding period progresses. Only the better grades of cattle should ordinarily be fed to a really high finish, and then only when the market on which the cattle will be sold is a discriminating one.

In choosing the grade of feeder cattle to purchase, not only should the above factors be considered, but also the difference in cost of the various grades and the anticipated difference in price at selling time. This will vary according to the demand. It may be more profitable to feed the low grades of feeder cattle rather than the better grades if there is an abundant supply of these lower grades and only a limited demand at the time of purchase; and if there is the prospect of selling such grades on a favorable market. Well finished steers of good type and quality sell to best advantage during the late summer and fall as a general rule, but this time of year does not, however, provide a good market for the lower grades of slaughter cattle. On the other hand the best demand for the lower grades of slaughter cattle is in the spring, a market ordinarily comparatively low for well finished better grades of fed cattle.

In general there has been an increasing demand for lighter weight beef carcasses in this country. Fewer heavy cattle are being fed than formerly. There is a limited demand for finished heavy cattle, but when this demand is satisfied the price paid for such cattle is likely to suffer. For this reason feeder calves and yearlings are ordinarily a safer bet than older feeder cattle, since the market is more constant for

finished steers of these ages. While the younger cattle must be fed a better ration, they will not make as large daily gains as older cattle. They do make better utilization of the feed they consume, however, and require less feed per hundred weight of put on gain than will older cattle fed a similar ration.

In tests at the University of Maryland we have tried to get cattle on full feed in a period of from 30 to 45 days. It takes more time to bring feeder calves up to a full feed than other cattle. We plan on feeding an amount of feed that will be cleaned up readily and our practice is to feed twice daily.

The check ration for calves fed in 1940-41 consisted of an average daily feed per steer of 10.3 pounds shelled corn, 0.95 pound soybean oil meal, 4 pounds legume hay, and 3.70 pounds corn silage with a salt mixture made up of ½ stock salt, ¼ steamed bone meal, and ¼ ground limestone, available at all times. During the 1939-40 feeding season when yearling steers of good quality were fed, our check ration consisted of an average daily feed per steer of 13.1 pounds shelled corn, 1.2 pounds cottonseed meal, 3.7 pounds legume hay, and 8.7 pounds corn silage, with the salt mixture available at all times. We consider these to be satisfactory rations to feed to the better grades of calves and yearlings, respectively. Other grains and protein supplements might well be substituted if the price of these justified their use.

Cattle Tail Hair

Cattle tail tips are going to war as hair in army mattreses. Restriction of the sale and delivery of cattle tail hair, except to the armed forces, has been announced by WPB.

Because of its springiness and low susceptibility to moisture, the hair is ideal for padding material. In peacetime it was used largely in carpet sweepers and hair brushes, after the cows no longer needed it to swat flies with.

Only about eight inches of a cow's tail is used. At Fort Worth, Texas, alone nearly 150 tons of cattle tail hair are marketed yearly.

—*Farm Journal*

Here's Milk in Your Pail!

Condensed from Successful Farming

Paul H. Phillips
University of Wisconsin

MILK! Milk! Milk! Six to eight times her weight every year—maybe more. Who dares question the patriotism of your cow?

The dairyman has one certain responsibility. If forgotten today it may not show up tomorrow, maybe not next week. But just keep on forgetting and see what a hole it will put in your milk bucket.

This is the matter of cow nutrition, the thing that puts more milk in your pail. Feed? More than just that alone. It's giving that cow of yours the kind, amount, and quality of feed which will furnish the energy, protein, vitamins, and minerals she needs. Each in its own way is utilized for the production of milk and for other body functions.

A considerable number of commercial feeds are on the market, and those made by reputable manufacturers may better suit the convenience of short-handed dairyman. But maybe you'd like a few feeding formulas, too. Later, we can take them apart and look 'em over, piece by piece.

We must remember that no single formular for a ration will meet all farm conditions. However, it is possible to take a few simple rations and use them as guides. Substitutions may be made in them when market prices warrant, or as the feed picture on the farm changes.

If your hay happens to be timothy, you will get a 19-percent-protein grain mixture from the following ingredients: corn, 250 pounds; oats, 250; wheat bran, 250; soybean oil meal, 250; steamed bonemeal, 10; iodized salt, 10.

Now, supposing your hay is mixed clover and timothy. That means you will need slightly less protein in your feed-grain mixture. One containing 17 percent is as follows: corn, 300 pounds; oats, 300; wheat bran, 250; soybean oil meal, 150; steamed bonemeal, 10; iodized salt, 10.

You'll need still less protein in your grain mixture when feeding alfalfa or clover hay. One containing 13 percent protein consists of corn, 450 pounds; oats, 400; wheat bran, 100; soybean oil meal, 50; steamed bonemeal, 10; iodized salt, 10.

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Substitutions in these rations may be made rather easily. Cost determines relative economy, and personal preference also enters the picture.

The following substitutions can be made pound for pound in the rations just mentioned. For corn —corn and cob meal, barley. For wheat bran—malt sprouts, gluten feed, middlings, distillers' grains. For soybean oil meal—gluten meal, linseed meal, cottonseed meal.

Grain mixtures are fed at varioout levels. The following is rather practical for production up to 500 pounds of butterfat per year:

Pounds of Grain to Feed Per Day

Pound of Milk Produced Daily	Fat in Milk 3.5%	4.5%	5.5%
20	4.0 lbs.	6.0 lbs.	8.0 lbs.
30	7.0 lbs.	9.0 lbs.	11.0 lbs.
40	10.0 lbs.	12.0 lbs.	14.0 lbs.
50	12.5 lbs.	14.5 lbs.	16.5 lbs.
60	15.0 lbs.	17.0 lbs.	19.0 lbs.

There are two periods in the lactation cycle when relatively high levels of grain may be fed. The first is following the peak flow of milk. At this time heavy grain feeding can be resorted to without damage.

The second is during the dry period. Grain feeding here is desirable, and liberal grain feeding may be done safely to fortify the cow for the heavy drain of the following lactation. Feed her three to four pounds of grain each day while dry.

The practical measure of the energy content of a ration is the general condition or "flesh" of the cows. Show men and fatstock producers frequently make the mistake of thinking that they are feeding good rations because they are giving much grain in proportion to the hay. This means merely an out-of-balance ration with an over-supply of energy, which may account in many instances for the sterility found in fat animals. Overfatness is blamed for the sterility, when actually the real cause is a poor ration.

It is possible to save six percent of the protein in the grain mixture by feeding legume hay. Even a mixed legume and grass hay such as clover and timothy will save four percent protein.

Mature cattle with properly functioning paunches do not need outside sources of the B-vitamins, but they do need plenty of Vitamin A, obtaining it from plants rich in the pigment known as carotene, which is found with the green coloring matter of plants. Plenty of properly cured, green-colored hay, good-quality silage, and pasture will furnish this vitamin in amounts sufficient to improve milk production, increase reproductive efficiency, and promote proper elimination of the afterbirth at calving.

Grass or legume silage is an excellent carotene-containing feed. Ordinary corn silage can be improved in carotene content as much as 20-fold by putting it in the silo at the early-dough stage. Such silage will have less total digestible nutrients per ton, but its carotene content will be superior to corn silage made in the dent stage. It is possible to put up the corn silage to match the hay to be fed: the better the hay, the later the silage; the poorer the hay, the earlier the silage.

Vitamin C, or ascorbic acid, is made by the cow under normal circumstances. It has been shown, however, that certain cows fail to make all they need, and benefit from ascorbic acid injections to overcome "shy breeding."

Grains and mill feeds are rich in phosphorus. Hays, on the other hand, are relatively rich in calcium. Therefore, a ration including hay, grain, and silage is fairly well balanced as far as calcium and phosphorus are concerned.

When milk yields exceed 10,000 pounds per year, it is good insurance to include one or two percent of steamed bonemeal or other phosphorus carrier in the grain ration. Do not feed phosphate minerals which have not been defluorinated, since they contain toxic amounts of the poisonous element fluorine.

A mineral box for limestone or bonemeal and one for salt make a good investment. Cows will help themselves if allowed access to such a box. Care has to be taken only when the idea is new, in order to avoid gorging. Thereafter, they'll help themselves as the need arises.

Iodine in the form of iodized salt should be fed in the goiterous regions of the country. Stabilized iodine in iodized salts can now be procured, and this type is to be preferred.

Other trace minerals are needed in some sections of the country. Cobalt is needed in some restricted areas, and can be fed as cobaltous chloride at the rate of 1/25 ounce per 500 pounds of grain mixture. Manganese, needed in some sections, can be furnished as manganese sulphate at the rate of one ounce per 500 pounds of grain mix.

The urge of patriotism is leading the dairy farmer to push his cow to the limit of her capacity. This means that he must carefully and intelligently "bank" his feed reserves on the farm and in the cow.

The ultimate source of the necessary raw materials is in the feed. A few of these materials can be "banked" in the cow's body for future use, but unfortunately this bank account is limited. It must be replenished when withdrawn and kept intact for emergencies.

Poultry Feed Supplies

Condensed from Everybodys Poultry Magazine

C. E. Lee

IT hardly seems possible that we, in this country, who were so lately plagued with huge surpluses of feedstuffs, actually have serious shortages now with more shortages in the making, but that is the case.

The situation has its bright spots, however. Certainly, we are in nothing like the precarious situation which existed when the supply of Norwegian and other foreign cod liver oil was cut off by the spread of the war. At that time the production of D-activated animal sterol was small and and it was not known whether it could be expanded rapidly enough to meet the situation, but this source of the important vitamin D has been well developed.

High potency fish oils were definitely short, and it seemed likely that we would soon face a deficiency of both A and D in our rations. Had this occurred, it would have spelled disaster for the poultry industry.

About the same time there occurred a serious shortage of milk products. Tremendous amounts of dried skimmilk were being purchased for shipment to Britain and other countries under the lease-lend program. Milk not only went up spectacularly in price, but it was impossible to get deliveries for feed use.

Canada stopped the flow of wheat by-product feeds because they were needed at home. Our mills were turning out an amount wholly inadequate to meet the needs of our expanded livestock, and, here again, we faced a critical situation. The release of government wheat helped us out of that hole.

More or less critical situations existed on fish meal, alfalfa leaf meal, and meat scrap. Some of these are still with us.

One fact which stands out is that the great increase in the livestock population has caused the hugh stocks of feedstuffs to disappear at a rapid rate.

It was only a few months ago that we heard feed people discussing the big crop of soybeans raised in this country last year and predicting that much of the soybean oil meal, or the beans themselves, would have to be carried over another year.

Our 1941 crop has disappeared. Fortunately, the 1942 crop of beans will soon be flowing thru the processing plants.

A year ago the supply of soy-

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bean oil meal was approximately 2,000,000 tons and it is predicted that the larger crop this year may yield 3,000,000 tons. We hope this will be true, for every pound will be needed.

It is said that the production of peanuts this year will run about 10 times normal, and peanut meal is an excellent vegetable protein. There is some evidence to indicate that a blend of peanut meal and soybean oil meal is to be preferred to either one alone. Apparently, the Methionine and Cystine supplement each other. Unfortunately, the amount of peanut meal produced in this country each year is comparatively small and is not as widely available.

Production of fish meal will be much lower this year, due to requisitioning of trawlers by the government for mine sweepers and other activities, and due also to the restrictions imposed by Coast Guard defense regulations.

There has been some increase in dried whey production, and it seems likely that somewhat more dried skimmilk and dried buttermilk will be available this year than last, but the quality of much of the dried skimmilk now going to the feed trade is far below that which was the usual standard before the war. Furthermore the price is still high.

Liver meal has practically ceased to come into the country, and it is questionable whether further shipments can be expected either from South America, Australia, or New Zealand.

To summarize, therefore, we have probably in the neighborhood of 25 per cent more high protein feeds available than last year, but this increase is due entirely to the increase in vegetable protein feeds such as soybean oil meal, corn gluten meal, peanut meal, linseed oil meal, wheat germ meal, etc. This means that in using the protein materials which we have available this year, we must pay increased attention to the vitamin content of the ration, for these vegetable proteins are deficient in some of the vitamins, particularly riboflavin (B_2 or G), and they are also deficient in minerals, as compared with meat scrap, fish meal, and dried milk.

The quality of protein varies in soybean oil meal, not only according to the process used, but also from one lot to another, particularly with the hydraulic and the expeller processed meal. There is probably considerable variation in the value of the protein from different varieties of beans, but that is a subject which needs to be explored further. In general, good soybean oil meal, which means primarily soybean oil meal which has been properly heat-treated, is a good protein, and when properly supplemented with

mineral and vitamin carriers, it may be preferred to the average grade of meat scrap.

With the shutting off of importations of high quality glandular meat materials from South America, the quality of meat scrap available in eastern United States has undoubtedly suffered considably. It seems doubtful whether 55 per cent protein meat scrap can be produced today under the government ceiling prices, at a profit, without the substitution of blood, stick, and other materials which may show a good analysis of protein, but which provide protein which is an undesirable type for poultry.

Research at Cornell and other institutions has indicated that, in normal times, a 55 per cent meat is of higher protein quality than meat containing more or less protein, as a rule.

The following table showing the relative efficiency of protein supplements is taken from the Cornell "Feed Service" publication for August, 1942.

Attention should be called to the fact that these figures, while based on a number of tests, do not mean that every lot of each type of material could be assumed to have the efficiency shown. There is a very great deal of variation of raw materials. That is the reason why a good feed manufacturer needs not only a chemical, but also a fully equipped biological laboratory and research farm to permit the fullest testing of the materials which he buys as well as of experimental formulas and his regular production.

Relative Efficiency of Protein Supplements

Casein	**100**
Meat scrap	
75% protein	69
55% protein	82
50% protein	73
Soybean oil meal	
Soybean (raw)	58
Hydraulic processed meal	88
Expeller processed meal	89
Solvent process meal	92
Fish meal	
White fish, vacuum dried	104
White fish, steamed dried	104
White fish, flame dried	94
Menhaden, steam dried	91
Menhaden, flame dried	80
Sardine meal	98

Soybean oil meal and peanut meal are very good sources of pantothenic acid, the chick dermatosis vitamin or filtrate factor. That's a point in favor of the vegetable protein. (Other good sources, incidentally, are liver meal, brewers dried yeast, cane molasses, milk by-products, wheat bran, rice bran, etc.)

Fortunately, there is no shortage of riboflavin supplements. These also carry substantial amounts of pantothenic acid. Most of these are fermentation residues from distilleries. The

processes of concentration have been so developed that one of these concentrates is now sold on a guarantee of 250 micrograms of riboflavin per gram, as compared with 18 to 20 micrograms in dried skimmilk, about 30 in dried whey, 35 to 40 in brewers yeast, etc.

While there are limited amounts of the highest potency productions available, there is a tremendous amount of less potent materials running from around 14 or 15 micrograms of riboflavin to 30 micrograms which is available and which will be widely used. In short, there will be plenty of materials available for supplementing the soybean oil meal so that there will be no danger of a riboflavin deficiency, and these modified wartime rations will also carry plenty of the important chick antidermatosis vitamin, pantothenic acid.

The alfalfa situation is not reassuring. It is apparent that the amount of alfalfa leaf meal and alfalfa meal available for the year ahead will be considerably below what the industry could and would like to use. Serious floods in some of the middle western states destroyed thousands of acres of alfalfa early in the season, and it is now apparent that the best of weather during the fall will not enable producers to make up for the lost summer tonnage.

In this connection, it is to be hoped that substitutes may be found. A very promising substitute, in the shape of soybean leaf meal, appears to have been more or less generally overlooked, just why, we don't know. This material will frequently show a higher carotene analysis than alfalfa, and while the riboflavin analysis may run somewhat lower, it is still an excellent material from the standpoint of protein and carotene. It should be possible to produce large quantities of soybean leaf meal in this country without the least difficulty. It could be processed in the same plants that are used for processing alfalfa leaf meal.

Cereal grass production will help out in this situation, but the total amount is too small to help greatly in view of the large prospective shortage of alfalfa leaf meal and alfalfa meal.

In regard to fish oils and vitamin D supply, the situation is quite favorable. There is now no danger of a shortage of D-activated animal sterol and this will take care of the vitamin D requirements along with the supplies of vitamin D oil which are still available.

Apparently, there is an excellent stock of vitamin A fish oils in the country at the present time and the government is reported to be acquiring a stock pile. Fishing for soup fin sharks

and other fish yielding high vitamin A oil has been greatly expanded, and this has solved the problem.

Fortunately, too, the government allowed the price for vitamin A fish oil to go high enough so that there was an incentive to increase fishing. If the price had been held down, it seems practically certain that we would not be in this fortunate position with a good reserve of vitamin A oil today.

Mill feeds promise to continue short because of shrinkage in import and lower output of American flour mills which do not find the demand for flour abroad that existed during the first World War. More government wheat may be used, and this may be ground up and substituted for part of the bran and middlings. The safest course seems to be to substitute ground wheat for one-half the total middlings and wheat red dog flour in the ration and to leave the bran undisturbed.

It is possible to carry this a bit further, perhaps, even to substitute ground wheat for half the total bran and middlings and wheat red dog flour in the ration, but care must be taken not to make a feed which will be too sticky. A ration can easily be made too concentrated — too much like a cheese diet.

Estimates of grain indicate that we shall probably carry over 4 or 5 per cent less grain than a year ago, but the total supply of wheat is estimated to be around 200 million bushels over the supply last year. The wheat storage problem is acute, but it will vanish as the year goes along, for the supply of feed grains for animals for the year ahead will be markedly smaller than a year ago.

In the press release dated September 16, Secretary of Agriculture Claude R. Wickard called upon the nation's poultry industry to produce 200 million extra chickens during the coming fall and winter months to help supplement the supplies of meat available for civilian use. If this is done, more than a million additional tons of feed will be required if they are marketed at an average weight of about three pounds.

Secretary Wickard has pointed out that we must make more use of feed wheat, for we are using up our corn faster than we are producing it. This year we are apparently using about 150 million bushels more corn than we raised last year, and during the year ahead, it is expected that unless we feed much more wheat than usual, over 200 million more bushels of corn than we will get out of the 1942 crop will be required.

How to Conserve Nitrogen

Condensed from Better Crops With Plant Food

F. G. Merkle

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NITROGEN is a peculiar element. It is the characteristic chemical element in the proteins which are the "pre-eminent" constituents of living cells. It is important, therefore, in giving life to all living things. But, paradoxically, it is a basic constituent of explosives which are important in giving death to living things. Hence, at this time there is a double demand for nitrogen, that is, for growing crops and for munitions. The latter is so great that we are now threatened with a shortage of fixed nitrogen.

Nitrogenous fertilizers were among the first fertilizers used in addition to animal manures. Their use has become almost imperative for many types of crop production, because our agricultural methods allow losses to occur which never took place under natural conditions. In the native forest which covered the soils of eastern United States, the trees and shrubs assimilated from 50 to 100 pounds of nitrogen from the soil per acre per year. This was the most readily available nitrogen. Very little nitrogen was lost by leaching because the roots of perennials were alive in the soil at all times. Nearly all the nitrogen taken up by the trees and shrubs was returned to the soil sooner or later in the fall of leaves and finally the entire tree. Neither was there much loss by erosion under these conditions. Cultivated crops do not require more nitrogen than the native vegetation did, but in the way we grow them, the losses are much greater.

Most Eastern soils contain from 1,500 to 3,000 pounds of total nitrogen which is chiefly in the surface soil. A small portion of this becomes available yearly. This small amount is either taken up by the crops planted or it is lost by leaching. In addition, the accelerated erosion which takes place on cropped land may remove as much as the crops remove. Replenishing with fertilizer nitrogen becomes essential because year by year the most readily available soil nitrogen is removed far from the soil in which it originally existed.

In general, those types of agriculture which most nearly re-

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semble natural conditions are the least likely to need fertilizer nitrogen. Of all types of farming, dairying is perhaps most nearly like natural forest, because the dairy cow consumes her food either in the pasture or in the barn. In the first case, the excrements are returned directly to the soil with little loss. In case she is fed in the barn, the manure is presumably returned with some loss.

In the production of vegetables, tobacco, cotton, or any crop which is sold from the farm, there is little or no prospect of returning the nitrogen it contained to the soil from which it came. This may mean the yearly removal of from 50 to 150 pounds of the best nitrogen that the soil contained. This cannot continue long.

In addition to the above, losses by leaching and erosion take place in considerable amounts when soil is cultivated. During the fall, winter, and spring when the corn and potato lands are bare, leaching may remove almost enough soluble, available nitrogen to grow an ordinary crop. Erosion, likewise, may be considerable during the spring months on poorly covered land.

When there is plenty of anything, we are prone to obtain it the easiest way, to use it extravagantly, and even to waste it. However, when a shortage arises, our attention is attracted to conserving what we have. While it is well known that leguminous crops fix atmospheric nitrogen in sufficient quantity to feed themselves and some of the crops which follow them, it is true that if the legume program is not already in progress on a given soil, it may take a year or two to whip it into shape so that it will begin to supply our needs. We need the nitrogen now for next year's crop. Therefore, we must first turn our attention to conserving and using supplies at hand and, in the meantime, institute a program of legume fixation.

The amount of highy available good quality nitrogen wasted in Northeastern agriculture is tremendous. It is safe to estimate that two or three times as much highly available nitrogen is lost in handling manure as is contained in all purchased fertilizers. If this loss could be reduced to one-half its present amount, the nitrogen shortage problem would be solved at once.

Nitrogen may be lost from manures through fermentation in the gaseous form, as ammonia, and in the liquid form, as soluble compounds consisting of nitrate, ammonia, and soluble organic nitrogen. The greater loss, and the one most feasible to control, is the loss in the liquid form in leaching. If one makes it a point to examine every stable and barn-

yard as he tours cross country, he will observe that a large percentage of them are so arranged that loss of liquid manures is considerable. These liquids contain over half the total nitrogen excreted by the animal and the nitrogen they contain is over twice as active as that contained in the solid excrements. Urine may be lost in poorly constructed stables with leaky floors, particularly when insufficient bedding is used.

Additional losses occur if manure is piled on a sloping surface near the barn. The pressure produced when manure is piled in high piles squeezes much of the liquid portion out so that, even though the loose bedding appears to absorb considerable liquid, it may be lost later when piled under pressure. Many barnyard walls are little better than sieves which hold the solids and allow the valuable liquids to leak through.

The measures which suggest themselves to reduce these losses are: First, the use of ample absorbent and the transferring of the manure in the loose condition directly to the field before the juice is squeezed out; second, if it must be stored for periods, it will pay well to construct a watertight concrete pit having both sides and bottom completely waterproofed. The loss of nitrogen in the gaseous form, as ammonia, is probably not nearly as great as the loss through leaching, and it is not as easily controlled. Loss of ammonia gas may take place in the stable, in the storage pile, or in the field. The use of superphosphate in the gutters helps reduce this loss by converting the ammonia to a nonvolatile compound. One or two pounds of superphosphate per cow per day, scattered in the gutters, is a customary quantity.

Pennsylvania farmers have in past years used over 8,000 tons of fertilizer nitrogen yearly for which they paid over two million dollars. Big as this figure is, the nitrogen losses in handling manure are easily two or three times as great. And, with a little care, the losses in nitrogen may easily be cut in half.

Another instance in which high quality nitrogen is wasted is in leaching from soils. Each year, during the winter and spring, a considerable proportion of the melted snows and the rains filters through the soil, finding its way into the ground waters. Any nitrates left in the soil at the close of the growing season may be completely removed by the percolating waters. Analyses show that soils contain little or no nitrate nitrogen in the early spring. It has been washed out. The amount so lost is very considerable and is of high quality.

Research has shown that land

left bare during the leaching months may lose enough nitrate to grow an ordinary crop. It also has shown that when soil is growing fibrous-rooted, sod-forming crops, there is almost no loss of nitrogen by leaching. This information suggests the value of cover cropping cultivated lands during those periods when it would otherwise be bare. At the close of the growing season, after harvesting such crops as corn, potatoes, tobacco, and most vegetables, there remains in the soil more or less unused nitrate and more nitrate continues to be produced by bacterial action during the fall months. This nitrate is quite certain to be leached out during the winter unless it is taken up by some crop.

A cover crop planted, either while the main crop is still occupying the land, or as soon as possible after harvesting, will quickly take up this nitrate and build it into plant protein which will be released the next spring when this cover crop is plowed under and decays. Rye grass or meadow fescue may be planted in the standing corn at the last cultivation. Rye or rye and vetch may be planted immediately after digging potatoes. Rye grass, meadow fescue, and, in some cases, crimson clover may be satisfactorily used as cover crops in vegetable production. These may be sown even before the vegetables have been harvested, after the chief growing season has passed.

It may be roughly assumed that a good stand of cover crop will assimilate possibly 20 to 40 pounds of nitrogen before it is plowed under the following spring. This nitrogen would be lost were the cover crop not grown. Of course, the cover crop will perform other benefits besides simply controlling nitrate loss; it will add organic matter, improve the soil physically, and control erosion.

Checking Erosion

Erosion, which likewise takes its greatest toll when the soil is bare or in row crops, is another loss which can be reduced considerably by cover cropping. While the nitrogen lost by leaching of manure or leaching from soil is of the highest quality, a good portion of the nitrogen lost by erosion is crude organic nitrogen. Possibly 20 to 120 pounds of total nitrogen may be lost in a single year by erosion from bare soil, small grains, or row crops.

Preventing or decreasing the losses described above seems to be the most effective way of quickly meeting any shortage of nitrogen that this emergency may bring about. A little slower, but nevertheless equally important, means of meeting any shortage of nitrogen fertilizer is the greater use of adapted legumes. Those

farms which are now producing good stands of alfalfa, sweet clover, or ordinary clovers in mixtures with grasses, need little or no nitrogen for corn and small grains. But, there are too many farms in the Northeast upon which a good stand of legumes is a rarity. Our most useful legumes require moderate to good drainage, plenty of lime, and a good supply of available mineral elements, chiefly potash and phosphate.

There are not many areas now under cultivation which have such poor drainage that alsike clover will not grow, if other conditions are right. There are a great many soils which are entirely too acid for legumes. More than half of the general farm soils and orchard soils which have been analyzed at the Pennsylvania Experiment Station are too acid to grow clover. In most instances, the strongly acid soils are deficient in available phosphate and potash. Acidity in soils tends to reduce the availability of phosphate even though phosphate is applied in soluble fertilizers.

To make these acid-deficient soils capable of growing legumes well, a soil improvement program is essential. Such a program calls for sufficient lime and the building up of the available mineral status by manure or mineral fertilizers, or both. Sometimes much of the value of mineral fertilizers may be lost when applied to a dead soil. Failure to get a response may not signify that the minerals are not needed. It may mean that they are being fixed or otherwise rendered unavailable. It is seldom possible to take a strongly acid, biologically inactive soil and make it suitable for lime-loving legumes in one year. However, within two or three years, if active organic matter is added in crop residues or manure and sufficient mineral elements supplied, such a soil may be made suitable for the ordinary legumes.

Another suggestion that may serve as a temporary relief, if nitrogen shortage becomes acute, is aiding the release of soil nitrogen. Soils contain 1,500 to 3,000 pounds of total nitrogen in the surface soil. Most of this is quite resistant to bacterial attack. Liming, sufficient to make the soil nearly neutral, and cultivation to aid bacterial action and eliminate competition will help raise the level of nitrate concentration in the soil. Of course, such a practice which merely releases some of the stock nitrogen without adding any, and which even invites a loss by run-off and leaching, cannot be continued long without harmful soil destruction. It is, nevertheless, an expedient measure, justifiable while the emergency exists.

Cost and Care of Dairy Heifers

Condensed from The Rural New-Yorker

R. W. Duck

IT is more important than ever that our comiug crop of heifers be properly grown and developed.

Numerous State Experiment Stations as well as the U. S. Department of Agriculture have carefully collected data relative to desirable rates of gain and growth for the different dairy breeds. From these averages a so-called normal standard may be computed; however, there are also contributing factors which cold figures cannot entirely cover. It is possible for heifers to exceed these standards, especially for gains, and still not represent the optimum for possible later potential milk production. Probably it is more common to underfeed, but the fact remains that heifers over-fed for gain may become too fat, and develop fat udders which will not permit normal glandular development for best milk secretion.

Investigators at several of our leading Stations seem generally agreed that more heifers are improperly fed or underfed from the age of six months on than from calfhood to six months. Average figures for the four leading dairy breeds show that a six months old Holstein heifer should measure about 40 inches high at the withers from a level position, measured at highest point of the withers. A satisfactory weight at six months is from 360 to 370 pounds. Weights for Ayrshire heifers at six months should average from 280 to 290 pounds with height at withers from 36 to 37 inches. Guernsey weights are from 265 to 270 pounds and from 37 to 38 inches at the withers. Jersey heifers should average 250 pounds or slightly over, and be from 36 to 37 inches high at the withers.

Average daily gains for the experimental Holstein heifers during their next six months was about 1.6 pounds. Their average weight, which was considered satisfactory, at one year of age was between 650 and 660 pounds. They averaged 46 and 47 inches high at the withers. The Ayrshires, in accordance with desirable breed standards and requirements, averaged 530 to 544 pounds and about 43 inches in height. Guernseys averaged 485

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to 495 pounds in weight and between 43 and 44 inches high at the withers. The Jersey heifers at 12 months averaged 460 to 465 pounds in weight and from 42 to 43 inches high.

Many gains are made in excess of those mentioned, but the average of all heifers, grades and registered, in the United States will be less than the weights stated. The heights and weights mentioned can be considered normal and generally satisfactory, but not necessarily optimum.

As pastures become short and dry during late Summer many heifers come into Winter quarters in a subnormal condition, both for health and flesh. Sometimes they are then run-around a straw stack throughout the entire Winter and if given any hay it is often of the poorest quality. Slow gains and growth are the inevitable result. The actual cost per head for wintering may be less, but to make a milk cow the final cost is greater, and still more important, the influence on subsequent production is profound, with corresponding lower net return from the individual.

Some of the best grown and thriftiest heifers I have seen in a long time were observed last Winter in the herd of M. T. Ledgerwood, near Penn Yan, Yates County, New York. These deep middled, well developed yearling Guernsey heifers of Mr. Ledgerwood's had been on good to excellent pasture the previous Summer, and also had access while on pasture, to good quality mixed hay to eat as desired. Without exception where heifers are doing well it will usually be found that even good pasture has been supplemented with good quality hay or Summer silage. Very few pastures rate as good, and as Summer gets along even good pasturage usually becomes too dry and stemmy to provide sufficient and proper nutrients for normal gains and growth. During their first Winter the heifers mentioned had access to a straw stack and good mixed clover and alfalfa hay at all times. They were fed enough corn to keep them growing and gaining at a suitable rate. Some corn stalks were also fed from time to time. They had free access to a well drained lot and could run in and out of a dry, well bedded barn, open on the south. Salt was available at all times.

This system certainly was not complicated and entailed the minimum of expense and labor. I have seen these desirable results for gains and growth duplicated in numerous other instances. It has impressed me with the important consideration that the concentrate mixture or grain fed to young stock is very definitely secondary in importance to the

kind and amount of roughage used. Plenty of good quality roughage provides needed nutrients in their most economical form, and, equally important, produces the physiologic effect of developing large and deep middles with consequent increased capacity.

Breed associations set age limitations relative to first calving; however, equally if not more important are the factors of maturity, size and weight. Age can be readily checked from registration records, and is perhaps more constant than the other variable influencing factors. The investigations of Turner at the Missouri Station, based on an Advanced Registry Record study on the various dairy breeds, shows that if heifers drop the first calf when about 24 months of age or slightly older they are heavier producers on their first lactation than younger freshening heifers. Breeders have found, however, that there is a definite danger in delaying breeding much beyond the age of 16 months. If allowed to go too long heifers are often difficult to settle and may remain so throughout their entire life.

In general the high-test breeds seem to attain puberty at an earlier age than heavy breeds. The earliest instance of bovine conception I have observed was that of a registered Jersey heifer running in pasture with other heifer calves and some bull calves. She dropped a normal calf when slightly under one year of age. With an average gestation period of 280 days this heifer then conceived at something under 12 weeks of age. She remained permanently stunted, although a fair producer, but her calf by this early conception developed almost normal for size and production. Breed regulations prevented, as it should, to discourage such premature breeding, the registration of this calf.

The finding of Knott, Washington Station, based on Holstein studies, show that cows from five to six years of age tend to have a slightly longer gestation period than do younger or older females. Most gestation tables are based on a period varying from 281 to 286 days duration. These time periods often do not agree with those observed by many breeders, when based on accurate averages. Managers of several leading herds have informed me that their herd tendency for normal bovine gestation is from 278 to 280 days, with a decidedly larger number of births occurring under 280 days, as compared with a gestation period of over 280 days. Some breeders report that certain bulls and bloodlines have an influence on the gestation period of their daughters, possibly through some inheritance factor or factors. Ob-

servations seem to indicate that close-breeding, if it has any influence, tends to slightly shorten the average normal gestation period. It is also believed by some that bulls seven years and older tend to sire calves that are carried longer than those of younger bulls.

Hayden's studies at the Ohio Station with good registered dairy heifers showed the following amounts of feed were on the average required to grow them well, up to time of first calving.

Whole milk fed per head was 482 lbs., skim milk 2,987 lbs., concentrates and calf meals 1,454 lbs., hay 2,244 lbs., silage 2,858 lbs., and pasture 281 days. The total feed cost for raising these two-year-old heifers would be about $95 per head with feed prices as follows, whole milk at $2.50 per 100 lbs., skim milk at 50 cents per cwt., concentrate and meals at $40 per ton, hay at $20 per ton, pasture at $10 per head.

Supplementary Pasture Crops

Missouri's bluegrass pastures are far better now than they were 10 years ago, says W. C. Etheridge of the University of Missouri College of Agriculture, Columbia, and much of this improvement has resulted from the widespread use of supplementary pasture crops that gave permanent pastures a rest in summer and fall.

Bluegrass should be grazed heavily from the middle of April till the middle of June, for this is the period when animals grazing on bluegrass make their best gains in meat or milk production, Mr. Etheridge says. At the end of this period the stock should be moved to lespedeza to insure continued gains and to give the bluegrass a rest.

Livestock can remain on lespedeza pasture until the lespedeza seed crop begins to harden and then should be moved to fall grain pasture or first-year sweet clover. In winter the stock can again be turned on the bluegrass, which by that time has completed its fall growth, storing plant food in the roots and a good crop of cured forage above ground.

Bluegrass pastures are also greatly improved by applications of limestone and fertilizers worked into the sod with grain drill or disk.—*Hereford Journal*

Crisscross Meat

Condensed from Farm Journal and Farmer's Wife

LAST December in Chicago, six prominent livestock judges and professors lined up around a medium-weight black steer from Purdue University that was about to be photographed. They wanted to be seen in the picture with the animal that had just been judged grand champion steer of the International Livestock Exposition.

There was a time when they wouldn't have been so eager to get into a picture with an animal like this black steer, for he was the kind of animal they would have frowned upon a generation ago.

Named Loyal Alumnus Fourth, he was nevertheless a crossbred, sired by a purebred Angus bull and out of a purebred Shorthorn cow. Ringside followers said he was "the greatest piece of beef" ever to appear on the tanbark of the world's largest livestock show.

Thus, crossbred beef has arrived. While this steer was winning grand champion honors at the International, a blue roan steer from the University of Wisconsin feed lots, out of an Angus cow and by a white Shorthorn bull, won the top place in the medium-weight Shorthorn division. Fourth money went to a Shorthorn-Angus crossbred 4-H club steer from Iowa.

This present interest of agricultural colleges and experiment stations in crisscross beef embraces more than just picking out a crossbred calf, fattening it and taking it to the fair. As with crossbred swine, the colleges and stations are now trying to find out whether crossbred calves have advantages over purebreds, and which crosses produce the most economical beef.

Two years ago this fall, Ohio farmers who attended Livestock Day at Wooster were taken out to a pasture not far from the experiment station barns to see an unusual beef breeding herd. In the field were purebred Angus cows (black, no horns) and purebred Hereford cows (red, white face, horns). Running with the cows were hornless calves, some black, some red with white faces and some black with white faces—but all of them without horns.

These cows and calves constituted a crossbred experiment. Half of the Angus heifers (28 in number) had been bred to Angus bulls, and half to Hereford bulls. Half of the Hereford heifers (28

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in number) had been bred to an Angus bull and half to a Hereford.

The calves were put into the fattening lots the following April and went on feed about three weeks later. When they went to market last December for Christmas beef, there wasn't a poor carcass in the lot.

The crossbreds out of cows in one-half of the breeding herd outgained the purebreds out of cows in that same division. In the other half of the breeding herd, the results were not so favorable to crossbreds. A second crop of hornless calves is now on feed.

Right along the same line is some work being done at the U. S. Range Livestock Experiment Station, Miles City, Montana, by livestock experts from Uncle Sam's research center (Beltsville, Maryland) and from Montana State College. These men are testing the possibility of maintaining "hybrid vigor" in cattle by crossing foundation Hereford cows with Shorthorn, Angus and Hereford bulls, which are used to sire successive generations of the progeny.

Results of the first cross in which Shorthorn bulls were mated with Hereford cows indicate the "find" of an effective way of increasing our beef supply for war needs, on a strictly common-sense basis, with reasonable profits accruing to the feeders. The crossbred calves excelled the purebreds in rapidity of gain, total live weight at market time, and higher dressing percentage. The crossbreds also suffered fewer digestive disturbances in the feed lot, and generally were less variable.

In seeking for more economical beef through crossing pure breeds, the cattlemen are saying, in effect, "these are hybrid times and we want to cash in on that hybrid vigor which has already shown itself in corn, where two inbred strains are outcrossed."

Can hybrid vigor be secured in livestock by crossing pure breeds, as in production of hybrid corn? Many livestock men say "yes," and they point to the widespread practice (supported by the say-so of experiment stations) of crossing swine breeds. On the St. Paul market 80 per cent or more of the hogs received are crossbred, though many of the animals do not show it because they carry the color markings of one or the other of the pure breeds crossed.

Swine breeding experiments at the Minnesota Experiment Station, reported by Professor L. M. Winters and his associates, bolster the idea of hybrid vigor. These Minnesota experimenters say crossbreeding swine results in larger litters, stronger pigs at birth, fewer losses after birth, faster gains and less feed per

pound of gain; also, that crossbred females make better brood sows.

Two new methods of breeding market swine are proposed by these Minnesota men. Both methods provide for use of crossbred females and good purebred boars. One method, called crisscross breeding, is to alternate in the use of boars belonging to two breeds. The other method is to rotate in the use of boars belonging to three breeds.

The belief of these Minnesota men in the value of crossbreeding swine has been echoed at quite a few other experiment stations, but not at all of them. An exception is Illinois. W. E. Carroll, chief in swine husbandry, and E. Roberts, chief in animal genetics, at the Illinois Experiment Station, challenge the value of crossbreeding swine, and along with it the standards which have been widely used for measuring the value of crossbreeding.

They say: "For crossbreeding to be judged beneficial, the performance of the crossbreds must excel the performance of the better of the two parental strains of purebreds."

The bulletin reviews what has been done by our investigators. Over 50,000 animals were involved in the experiments which the authors reviewed before going into print with their conclusions.

Tire Girdles

Tire Girdles and Sandals are on the market. Firestone Rubber Co. has developed a cotton cord "girdle" that fits over the inner tube and protects it from tire cuts and breaks. The "sandals," —a product of U. S. Rubber Co., —look like a bathmat dipped in a tar barrel, but actually are a cotton pile fabric soaked in an asphalt emulsion. They lock over the outside of the tire. Tests show that they'll give 2,500 to 3,000 miles wear if you keep to 30 m.p.h.—*Farm Journal*

Nodular Worm Disease of Sheep

Condensed from Sheep Breeder

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ONE of the most damaging parasites of sheep is the nodular worm, so named because it causes abcesslike swellings or nodules in the wall of the intestines, and produces the condition called nodular disease, pimply gut, or knotty gut.

Nodular disease is directly responsible for serious losses to the meat industry and to the sheep raiser. The formation of nodules and gritty masses in the wall of the intestine causes direct loss by rendering the intestines unfit for sausage casings or for the manufacture of surgical sutures. Loss of casings has been estimated to amount to from $500,000 to $700,000 a year in Ohio alone, and several million dollars a year for the entire country. The indirect losses resulting from the undermining of the health of sheep by nodular worms are less obvious but are probably equally large. In time of war the loss of meat and wool and of intestines from which to make casings and surgical sutures becomes doubly serious because of the greatly increased demand for all these products. The loss of intestines is especially serious in the face of difficulties in obtaining them from other sheep-raising countries.

Nodular disease is common in farm flocks in the United States, being especially prevalent in the Southern and Eastern states, although it is spreading westward and becoming troublesome in the Midwestern states.

The adult, crook-shaped worms are about half an inch long and are found unattached in the upper part of the intestine. The infective larvae (small, immature worms) develop in about a week from eggs passed in manure. Sheep become infected by eating grass upon which these larvae have crawled. After being swallowed the worms develop for a few days in the wall of the intestines and complete their growth to the egg-laying stage in the large intestine in about 35 days.

Worms which fail to escape from the intestinal wall cause the development of the persistant nodules which are characteristic of the disease. Ordinarily, the development of nodular disease

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is a cumulative process throughout the life of an animal. These nodules often reach the size of a large pea and contain a green, cheesy material, or a brown, gritty mass. When present in large numbers the nodules cause great thickening and constriction of the wall of the intestines. Some of the worms eventually break out of the nodules into the intestine, leaving ulcers; others wander into the abdominal cavity producing nodules in the abdominal organs and sometimes causing peritonitis and adhesions. The worms irritate the large intestine, causing it to become thickened and reddened; secretion of mucus is stimulated, the dung becomes soft at first and this finally gives way to diarrhea.

Sheep harboring small numbers of worms and nodules may show no symptoms, but when large numbers are present the dung becomes soft and the sheep may lose weight slightly or gain less rapidly than formerly. In severely infected sheep stunting takes place; the wool becomes dry, yellow, and irregular; there is a marked loss of weight leading to extreme emaciation; chronic diarrhea develops causing great soiling of the wool; passing of dung becomes painful and is associated with straining and a characteristic hunched-up posture; the sheep become dull, inactive, and weak; and loss of appetite may occur. Despite the severity of the disease many animals survive this acute stage and show gradual disappearance of the most marked symptoms although still suffering chronically from the effects of a greatly thickened and nodule-studded intestine.

Occurrence of the symptoms described above, especially in the fall and winter, definitely suggests the presence of nodular disease. The infection can be diagnosed in the living animal by finding the pea-size firmly embedded nodules by gentle exploration of the wall of the rectum with the finger. The presence of even light infections in flocks may be easily demonstrated after slaughter by finding the characteristic nodules or gritty masses in the walls of the intestines, or by finding the adult worms on the lining of the large intestine. Microscopic identification of the eggs of the nodular worm in the dung is difficult.

Treatment is essential to the control of nodular disease but it is not a cure. Young worms that are in the nodules of the small and large intestines are beyond the reach of drugs, and there is no treatment that can effectively remove the nodules which already exist. While the results of treatment, therefore, are not so evident as they are in most other kinds of parasitism, removal of the

adult nodular worms affords some immediate benefit to diseased sheep and also helps to prevent more serious disease in these animals by reducing the risks of further infection.

Phenothiazine is effective for the removal of adult nodular worms from the large intestine and has the added advantage of effective action against most of the other economically important roundworm parasites of sheep. The dose for adult sheep is 25 grams or approximately one ounce. For lambs weighing less than 60 pounds, 15 grams is generally adequate. It may be administered in capsules, in feed, or in the form of a drench and should be given under the supervision of a veterinarian. A satisfactory suspension for use as a drench can be prepared by thoroughly mixing 25 grams of the drug with 15 cc. (one-half fluid ounce) of molasses and then mixing this with enough warm water to make about 45 cc. or 1½ ounces. Many proprietary products containing phenothiazine are specifically designed for use as drenches or as prepared capsules; these should be used according to the directions accompanying them. The administration of phenothiazine in feed appeals to flock owners because of its relative simplicity and greater economy, and, in limited trials, this method of treatment has proved to be safe and especially well adapted for worming pregnant ewes. Only a few animals should be treated in one group and they should be sufficiently hungry to consume the medicated feed in from a few hours to a day. The following formula has been used for treating sheep in groups of five:

Phenothiazine, 125 grams
(about 4½ ounces)
Molasses, 125 cc.
(about 4fluid ounces)
Water, 100 cc.
(about 3 fluid ounces)
Oats and bran, 4 pounds.

A simpler mixture, involving the addition of the drug directly to moistened grain has also been used with good results. In this case it may be necessary to use a slightly larger amount of feed. Thorough mixing is essential. There should be available at the trough sufficient space for all animals to feed at the same time. Sheep varying greatly in size should not be treated together. Weak animals should be treated separately, or watched to make sure that they are consuming enough of the medicated mixture. There should be access to water at all times.

No serious symptons have been reported in sheep following treatment with phenothiazine. Some of the drug is excreted as a dye in the urine, causing the latter to turn red on exposure to the air.

To minimize staining of the wool, treated sheep may be kept for a few days on thick bedding or on the ground where the urine will be absorbed quickly. There is no evidence, however, that the stain affects the value of the fleece and under ordinary circumstances it disappears after a month or so.

The practical prevention of nodular disease can be achieved in greatest measure by timely treatment with phenothiazine in conjunction with pasture hygiene and general sanitation. Sheep raised in Northern States are afforded considerable natural protection against parasitism since pasture contamination drops to insignificant levels during the long, hard winters. Indeed, present evidence indicates that no infective larvae of nodular worms survive on unused pastures during moderately severe winters. Between seasons, therefore, the infection is carried over in the first breeding stock. The pregnant ewe is the first and most dangerous source of infection to the young lamb. She should be treated at least once during the last two months of gestation, preferably twice, with an interval of a month between treatments, in order to remove as many parasites as possible. The premises and stalls where the lambs are dropped should be clean. While ewes and their lambs are indoors, manure should be removed from the pens twice weekly. The greatest number of adult worms is present in the intestines of sheep in early spring—presumably the result of the continued emergence of larvae from nodules during the first four months or so following the previous grazing season. The intervention of an efficient anthelmintic to remove adult worms from breeding stock immediately before each grazing season should, therefore, result in a high measure of protection to the young stock. If only one treatment were to be given each year, this would be, theoretically, the most strategic time to give it. Moreover, if ewes and their lambs are kept indoors during the winter, the same pastures may be used again in the spring without significant risk to the lambs. The introduction of parasitized animals into this flock should be guarded against. Newly purchased animals and those that have not been effectively treated for the removal of their worms must not be put into the flock until they have been treated and about a week has elapsed to permit the loss of the worms expelled by the drug.

Unfortunately, these measures may not always be wholly effective; treatments, for example, usually do not remove all of the nodular worms that an animal has. There is, therefore, in every flock the possibility of a small residual infection which is a po-

tential source of severe disease unless other measures are employed. Risks from this source of danger can be avoided by shifting the flock to a new pasture before the old one has become heavily contaminated. One change of pastures in midsummer, perhaps in July, might be sufficient, although flocks in which infection with stomach worms or trichostrongyles has presented a serious problem, may require a change to new pasture more frequently. The old pasture may be used for other animals (except cattle and goats) or it may be rested. From the standpoint of the parasite problem, it matters little which method is followed; this must be determined by the individual farm.

While in northerly climates it may be sufficient to treat once or twice during the winter before the lambs are dropped and again in spring before the flock is put out to pasture, this limited number of treatments would be inadequate in warmer climates where sheep are grazed throughout the year. Under these latter conditions, additional treatments should be given once or twice during the summer and, if possible, the flock should be transferred to new pastures after treatment.

Ammonia Fertilizers

Ammonia Fertilizers may be so abundant after this war that they will change some of the basic trends of agriculture, Dr. Charles M. A. Stine, vice president of DuPont, prophesied in an address before the American Chemical Society at Buffalo on Sept. 7. "High pressure synthesis of ammonia," he added, "will take on a post-war industrial status that, in terms of new producing capacity, may be comparable to the discovery of a sixth continent."—*Farm Journal*

Untapped Food Reserves

Condensed from Marketing Activities

Jim Roe

BEFORE many months have passed you are going to be eating more soybeans and peanuts than you ever thought existed. You'll be eating them in the form of flour or grits in a long list of foods—and you'll be wondering why nobody ever told you about them before.

Mix soya or peanut flour in bread, to the extent of 10 percent of the wheat flour, and the protein value of that bread is increased 4 times. A dish of oatmeal fortified with 20 percent soya flakes gives you as much protein as would the same dish filled with plain oatmeal, plus a side dish containing a scrambled egg.

Mixed with pancake flour, soya flour can make one griddle cake as rich in protein as two used to be. In ground meat products, even chemists cannot easily tell how much is meat and how much is soybean or peanut grits. Stirred in with peas, milk, onion powder, and other seasoning, soya flour gives a soup as much protein punch as a piece of beefsteak.

The soya mills aren't yet in the retailing business. But soon you'll probably be able to obtain your "new" proteins mixed with cereals, and in combination with certain prepared meat products on your grocer's shelves. Within a year more recipes will have been developed for use in your own kitchen.

It is important to bear in mind that these new foods are supplements, not substitutes. You can't take soya or peanut flour or grits and end up with a steak, a roast, a chop, or anything faintly resembling these meats. The vegetable proteins have a neutral flavor when sampled alone and don't taste in the slightest like meat. But when used with ground meats as an extender — where you would ordinarily use cracker or bread crumbs—they add materially to the food value of that meal product. Used in breads, soups, cereals, and other foods, the effect is the same, the taste of the product is not changed. Oatmeal is still oatmeal; bread still tastes like bread. You will notice the difference, though, in the way you feel, for you'll be better fed.

You'll be eating cheaper proteins, too. Meats average about 15 percent protein, and with steak

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at 30 cents a pound, which sounds like wishful thinking, the meat protein cost comes to $2 a pound. Milk is 3½ percent protein; at 15 cents a quart, the milk protein also costs you about $2 a pound, though milk supplies large amounts of calcium at a low cost. Soya flour contains a cool 50 percent protein, and at 4¼ cents a pound, your soya protein is costing you only 8½ cents on a protein pound basis.

These products require some processing. It just doesn't work to take a bushel of soybeans or peanuts, grind it up into flour and mix it in your bread dough. That's why, until recently, these seeds were used very little as foods in this country. They have a natural raw, beany taste, which doesn't particularly please our palates.

But skillful scientists have found ways to cure the seeds and remove the beany taste. The oil is now being removed to go to war—and that's one of the reasons our supply of protein flours is skyrocketing. Our immense program for the production of vegetable oils has prompted the planting of millions of additional acres of these oilseeds.

The result is a flood of high-protein meal that is capable of supplying enough protein to counteract the coming meat squeeze several times over. We will produce this year some 6.5 to 7 million tons of this meal. We have facilities to prepare for table use less than 300,000 tons. The rest goes for animal feed. But it would be quite simple to convert many of these animal-feed plants to human food production.

One billion pounds of protein flours (only a half million tons of that meal) would fortify all the Nation's wheat flour to the extent of 5 percent. *This would supply as much protein as three billion pounds of meat—as much as our estimated under-supply for the coming year!*

That's not to say that soya and peanut flours will largely replace meat in our menus, though it has been indicated, with animal feeding, that it is possible. It does mean, however, that during these war times when our normal supplies of animal proteins are being stretched to cover the whole Allied world, we can and must include vegetable proteins in our diets to assure ourselves an adequate protein supply. There's no question of the practicability of such a move—it's now merely a matter of setting up the machinery.

War needs, of course, should and do come first. Our own Army is using these protein flours in ever-increasing amounts. The Quartermaster Corps is buying flour in large quantities each

month for their food stockpile, and it is being used in more and more of the Army rations. The Nazi army at the beginning of the war had some 200 recipes for the use of soya flour, and huge stockpiles of soybeans had been built up in Germany 3 or 4 years prior to the beginning of hostilities in 1939.

For several months the British have been receiving under Lend-Lease a product called" pork and soya links." Similar to sausage, this is made of ground pork and soya flour. Millions of pounds of the soya flour and grits have been shipped to England, to be used in meat products, commercial baking, soups, and milk substitutes.

Kohnehtpnpobahhay Kama doesn't sound very edible. Take it from the Russians, though, it tastes mighty good. The take-off on the alphabet is the Soviet way of saying "concentrated food," and the legend appears on Lend-Lease boxes of high-pressure oatmeal. Packed in a round box similar to oatmeal boxes on your grocer's shelves, this food has complete descriptions and directions in English on one side, in Russian on the other. The contents look like ordinary oatmeal, but consist of a quick-cooking mixture of rolled oats, soya flakes, dry skim milk, sugar and salt. It comes close to being a complete meal in itself.

Probably neither you nor your dog knew it at the time, but for the last few years he has been a jump head of you on this diet business. His food has contained soybeans for several years, and was a bit behind the Chinese, at that. For fifty centuries and more the soybean has kept the masses of Chinese nourished; it is known as the "poor man's meat" of China. The little bean was hoary with age when the ancient Egyptians laid the first stone of the Pyramids, and has been in the United States since 1804, when a Yankee Clipper ship brought a few bags back from China. Yet its real potentialities are just beginning to be realized.

For too many years we have thought of soybeans as a product farmers fed to cows. Peanuts, in little sacks, were the standard diet at fairs and carnivals.

Then a few years ago we came to think of soybeans as potential gear-shift knobs, dash boards, and even complete automobile bodies. Gadgets of every description, which looked better and worked better than steel, were fashioned of soybean plastics.

But the vegetable proteins' greatest contribution of all is yet to come. The Agricultural Marketing Administration already has a long range program well under way, aimed at the widespread distribution of this low-cost protein food to consumers everywhere.

New Magic for the Tobacco Crop

Condensed from Southern Agriculturist

Warner Ogden

OUTSTANDING research on by-products from low-grade tobacco is being done by the Kentucky Agricultural Experiment Station, Lexington. Striving to create a new market for low-grade tobaccos, and also to help divert it from competition with the better grade leaf, research workers have announced discoveries of how to make fiber board, wrapping paper, carton board, packing and insulating materials, varnish, soap, nicotinic acid and various insecticides.

The fiber board is made from cellulose remaining after nearly every other constituent has been removed by chemical processes. It produces a light board of unusual tenacity, which can be nailed, sawed, drilled and sanded to a smooth finish as well as or better than a wooden board. It may be used in airplane and automobile construction. In any event, it will supplement existing fiber board supplies. The packaging material shortage makes the new product important.

Since 1939, soap and varnish have been more or less at a premium in Europe, and this may affect the supply-and-demand situation in the United States. The soap made from tobacco by the Kentucky Experiment Station investigators is dark in color, but of excellent cleansing quality. The brownish varnish gives high luster when applied to smooth wood, without utilizing any other water-proofing or finishing product.

Two insecticides developed were found to be effective, and one of them already is in use throughout the nation. With larger gardens being required, insecticides will be in greater demand.

Research is under way in an attempt to produce a smoking tobacco of low nicotine content, and in the case of certain other tobaccos, of improving the burning qualities. Furfural has also been found in tobacco—a material used in solvents and in plastic manufacture. Tobacco also has malic, citric and oxalic acids as common ingredients. Fats, resins and waxes may also be obtained from it.

Nicotinic acid, a vital part of the Vitamin B complex, is not present in tobacco, but oddly enough, it can be derived from

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the poisonous alkaloid, nicotine. Nicotinic acid is important in preventing or treating certain food-deficiency diseases, such as pellagra, and plays a big part in the nation's nutrition campaign.

A different phase of tobacco research is that at the Tobacco Experiment Station in Greeneville, Tennessee, operated jointly by the University of Tennessee Experiment Station and the Bureau of Plant Industry of the U. S. Department of Agriculture. Creation of good curing weather for burley tobacco at all times, inside an "air-conditioned" tobacco barn, is the purpose of experiments conducted at the Tobacco Experiment Station, in cooperation with the Tennessee Valley Authority.

Heating and ventilating equipment has been developed to maintain the proper curing conditions of temperature and humidity within the barn. These curing conditions have been determined by extensive investigations conducted since the research work was started in 1936. Tests of the equipment and methods are being made to determine their value and the need for further improvements. The first large test last year on 2,000 pounds of burley tobacco was successful, the tobacco being estimated by buyers to be worth over three cents more per pound than tobacco from the same field cured the regular way.

Favorable curing conditions for burley tobacco, the research work indicates, consist of temperatures between 60 and 85 degrees Fahrenheit and relative humidity between 60 and 70 degrees. Higher temperatures and humidity than this were not harmful when occurring for less than 12-hour periods of time.

The favorable curing conditions are maintained by circulation of warm air through the tobacco whenever necessary by means of ventilating equipment which is controlled by a thermostat. The air is heated by a coal or wood stove or furnace situated in a low shed attached to the barn. The heated air is circulated by the ventilating equipment and passes out of ventilators in the roof. Electric heat was used at first but found too expensive due to the large amount of air being circulated. Little labor is needed except to attend the fire.

Increasing the Per Cent Foal Crop

Condensed from The Cattleman

Baron R. Dana

Assistant Professor of Animal Husbandry, Texas A. & M. College, College Station, Tex.

INCREASING the per cent foal crop is a subject of rather wide scope and has many angles or ramifications. Possibly it would be wise to more or less make the phrase "per cent foal crop" specific in its meaning. The term per cent foal crop is used here to mean the number of foals, expressed in per cent, that are born and raised to weaning time by those mares and fillies which are being bred and maintained for reproduction. For example, let us assume there are fifty mares in a breeding herd, all of which are being used for production of foals. Thirty-five foals are born and thirty of them are weaned. The per cent foal crop in this instance would be 60 per cent.

It is logical and plausible for any breeder of horses and mules to attempt to get this figure as close to 100 per cent as possible. The unfortunate part of the picture is the fact that the average figure runs closer to 50 per cent than to the figure mentioned. From studies that have been made the average per cent foal crop for farms and ranches maintaining their horses under somewhat artificial conditions, runs around 60-65 per cent. This figure for range bred horses or wild horses runs closer to 80-85 per cent. Such a wide variation between these two figures very definitely indicates that man would be better off as far as the per cent foal crop is concerned if he would let Mother Nature take her course. But such is not always possible or practical. We can, however, raise the figure to a considerable degree by following certain practices which will be discussed.

It stands to reason that the first job is to get the mares bred. And right here is one of the big problems. Too often the mare is covered and the owner feels that is all that is necessary. Just because a mare is covered by a stallion or jack is no sign or reason to believe she has conceived or is pregnant. Many stallion and jack owners wish that such was the case. Be that as it may, there are certain things that can be done which will increase the chances of a mare conceiving.

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First of all, those mares that have been given a well balanced ration are much more likely to have a normal functioning reproductive system. Green feed in the form of good pasture or a green leafy hay will usually mean increased breeding efficiency. Pasturage is more desirable than green hays, for there is a succulence, a palatability, and a superior nutritive value to the fresh growing grasses which hays do not have. The green leafy hays are second choice, but are far superior to the dried stovers and fodders which many brood mares are forced to eat. Give them a good pasture to run in, let them get the vitamin A and C that the green grasses have in them and one angle of the breeding problem is over.

At the same time, the maintenance of mares on pastures and ranges afford the opportunity for plenty of exercise, another factor which results in increased vigor and thriftiness of our brood matrons. Sunshine and plenty of fresh air are other points in favor of the range or pasture maintained mares. As to the state of flesh of mares for breeding one does not want excessive fatness nor does he want the other extreme. There are far more mares that fail to conceive because of lack of flesh than because of too high a state of condition. Cattlemen and sheepmen are all familiar with the effect of a drouth on the calf and lamb crops as well as the reaction good pastures have on the same. The colt crop is affected in the same manner.

The state of flesh and health of the stallion has a similar reaction on his breeding efficiency. Stallions getting a ration that is adequate in energy, protein, vitamins, minerals and succulence and who have the run of a pasture or paddock where they get plenty of fresh air, sunshine and exercise are generally the most potent in breeding ability. The following table is a summary of a study of the effect of rations stallions received on the percentage of foals gotten.

Ration	No. of Stallions	No. of Mares Bred	No. of Foals	% Foals
Corn	102	23,173	9,073	39
Corn and Oats	194	29,207	13,435	46
Oats	149	24,781	14,381	54
Oats and Bran	71	9,319	5,777	62
Grass and Alfalfa	81	4,658	3,773	81

Taken from Carlson's "Studies in Horse Breeding."

Although the accuracy of these figures may be questioned, they nevertheless show a definite trend toward greater potency with what is generally considered an improvement in the ration. Other studies have shown that the per cent foal crops run higher in those states where stockmen and horsemen rely more heavily

on the natural vegetation as the main source of feed for the brood mares and stallions.

Mares generally come in heat or season most readily and with the greatest degree of regularity in the spring and early summer months. That is the natural mating season for horses and it stands to reason that the greater part of the breeding operations should take place during that period. Many horsemen feel that the shedding of the winter coat is a good indication of highest breeding efficiency and use this sign as their guide. Most mares in good flesh will shed in the early spring months when the grass is green and the days are increasing in length.

There seems to be a certain time during the estrus or heat period when fertilization of the egg cell is more likely to occur than at others. From studies on the physiology of reproduction of mares evidence has been brought to light showing that the egg is shed from the ovary during the latter part of the heat period. Also it is rather generally accepted that the sperm cells (the male germ cells) do not have the ability to remain in an active, viable state for a period much over 12 to 24 hours. Before fertilization can take place the egg cell must be shed from the ovary and, if fertilization does take place, the sperm cells must be there to penetrate the egg when it is freed or shortly after.

Any person who has been observant of the length of the heat periods in mares knows that there is a considerable variation in the length of time mares will remain in season. Some mares will have a relatively short period, while others will remain in for a much longer time. Generally the lighter mares will have shorter heat periods than will the larger draft mares. Normally 3 to 7 days will catch the majority of all types of mares. Keeping in mind that ovulation usually takes place during the latter part of the heat period and that the sperm cells have a relatively short period of life, the mares should be bred toward the end of the period. Some authorities recommend breeding on the second day before the end of the heat period. Others recommend the breeding of mares every other day while they are in season. In all probability the latter method comes closer to what happens in the natural state. The former method implies that the mare owner knows the length of the heat period of each of his mares. This is not likely the case, for there are few breeders who tease their mares regularly enough to gain this information.

Experience here with the horses owned by the Texas A. & M. College points to a greater

efficiency by breeding a mare every day during the heat period. Although a greater efficiency is gotten by this procedure it is not wise to assume that every mare handled in this manner will conceive. All mares should be teased regularly to determine if there is a return of heat. The cessation of or failure to return in heat is possibly the most frequent sign used to determine pregnancy.

The majority of mares will be in heat 18 to 21 days following the going out of heat, if they do not conceive. That is to say a mare may be expected back in season between 18 and 21 days after the last day of the previous heat period. Although there is some variation in this the majority of normal mares will conform to this schedule. It is wise to follow up the first teasing trial with another in about 22 to 26 days. Any normal mare kicking off during the two teasing trials following breeding can generally be considered safe in foal.

Possibly the question of foal heat should receive some attention. The foal heat usually comes about 9 days after foaling. There is some variation in this, but the 9th day is most frequently observed. Mares may be bred at this time if they have had no difficulty in foaling and if they have cleaned up in good shape. Those mares showing a discharge, regardless of time since foaling, should not be bred. A discharge at any time is an indication of an abnormal condition of the reproductive tract and conception is not likely to take place. Also there is a possibility of the transmission of disease from one mare to another by way of the stallion.

Another thing which should be kept in mind is the frequency of use of the sire. One service a day is satisfactory for a horse four years old or over. Two- or three-year-olds should be used proportionately less. A four-year-old can care for two mares a day if he is fed well, handled properly, and given a day or two rest now and then. If he is used twice in one day the first service should be early in the day and the second in the evening. When one stops to consider the fact that between 75 and 150 cubic centimeters of semen are ejaculated with each service little doubt should remain as to why the rest between services and the rest of a day or two during the heavy part of the breeding season.

It is wise to check on the semen that is being produced by the stallion or jack. Such a check is made by examining the semen under the microscope for the activity of the individual cells. The cells should not only be highly active, but should also be moving forward. In some cases where stallions have failed to get their

mares settled motility tests have shown that the cells were very active, but their movement was not what is known as progressive. In other words the cells were more or less going in circles instead of moving forward. This forward movement is necessary for the traveling up through the reproductive tract of the mare. Further study of the semen may reveal a high percentage of abnormal cells which do not have fertilizing capacity.

The period of pregnancy is usually 340 days. Considerable variation exists here, older mares usually carrying their foals somewhat longer than young mares and mule foals being carried a trifle longer than horse foals. By keeping an accurate record of breeding dates, one can take better care of the pregnant mares and be on the watch as foaling time approaches.

During the pregnancy period much can be done to insure a good strong foal at birth. The mares should be given the run of a good pasture, if possible. Such additional feed in the form of palatable grains, oats being preferred, and clean bright hay, either prairie grass or alfalfa being satisfactory, should be provided as indicated by the condition of the mare and the growth of the pasture. Salt and bone meal should be made available at all times. The mare should be in good flesh at foaling time and the increase in flesh should be gradual. Don't get the mares extremely fat, for a weak foal is likely to be the result.

It is a very common observation to see the strongest, healthiest foals come from those mares that have been given plenty of exercise. There is no reason why pregnant mares can't and shouldn't be worked, be it in the form of working in harness or under saddle. Precaution should be taken against excessive straining or hard riding, but the exercise gained by the performance of some kind of work is desirable. As the pregnancy period progresses and the mares begin to show up heavy the work should slacken off in severity. A riding mare should not be ridden during the last 3 or 4 months. Those mares being maintained as brood mares in the strict sense of the word may be provided with exercise simply by keeping them in a pasture that is large enough to permit roaming around. By placing the salt licks or the feed troughs a considerable distance from the watering place the mares will take considerable exercise going to and from these.

Don't rush a group of mares through a gate nor get them excited when they are more or less hemmed in a corner of a lot or pasture. Such things may bring on abortions. Always handle a

pregnant mare in a gentle manner.

Foaling time is one of the most critical times for the foal and mare and anything which will result in comfort for the mare and safety for the foal is well worth while. Many foals are lost at foaling time because of a lack of adequate preparation before or attention at foaling time.

As far as equipment is concerned a bottle of iodine, a swab of cotton, a gunny sack or two, some kind of a shed or shelter, a bucket of water and some mild disinfectant is all that is needed. This may sound foolish to some horsemen who have raised horses for years and have been very successful. These materials are suggested because they do come in handy in cases where difficulty is encounted. Fortunately, mares that have been well fed, given plenty of exercise and handled correctly during the pregnancy period have very little difficulty in foaling. Once a mare starts to labor little time passes before the foal is on the ground. In such cases there is little need for giving assistance.

Once the foal is on the ground it is wise to see that the head is freed of the membranes or afterbirth to prevent suffocation and that the foal is breathing. If the foal is not breathing it may be brought on by blowing in the nostrils, by rubbing the foal with a gunny sack or by applying rhythmic pressure to the chest. It is also a good practice to place the foal a step or two away from the mare so she will not sit back on it or step on it when she gets up.

The navel cord should be painted with iodine shortly after the foal is born. This is a precautionary measure which is important primarily with those foals that are born in lots, traps, paddocks or stalls which have previously had horses in them. The disinfection of the navel is important because of the possibility of the entrance into the body through the navel of the organism causing navel ill or joint ill. This is a highly fatal disease of foals and may be prevented by the simple practice of swabbing or immersing the navel in tincture of iodine. Some horsemen following the practice of applying iodine to the navel daily until it is dried up. In case of cold or stormy weather the provision of a shed or wind break for the mare and foal is desirable.

After a foal has been born he is still dependent upon his dam for his source of food, but he has to work for it. While he was being carried by his dam his nutritive requirements were being taken care of by the mare. Now he has to stand up and suck for his feed. Many little foals find it difficult to locate the udder and,

once they have found it, have difficulty in learning to get hold of the teat and nurse. A little assistance by the attendant may do wonders in helping the foal at this time. In stubborn cases the attendant may have to milk out a small quantity of milk and try to nurse the foal artificially the first time or two by way of a clean bottle and nipple. Once they get the taste of the milk little difficulty is encountered.

It is of primary importance to let the foal get the first milk the mare produces. This first milk is definitely unlike normal milk. Its function is one of providing the new born foal with an extremely nutritive feed as well as a protection against certain organisms which may result in a weakened condition or possible death of the foal. It also has a laxative reaction on the digestive tract. This property of the colostrum (the name given to this first milk) helps to eliminate the fecal material which is in the digestive system. If this fecal matter is not removed shortly after the foal is born, constipation, weakness and death may result. Therefore it is essential that the foal get this first milk. Some men who have seen a mare with a distended udder have milked the mare out, feeling they were doing a kindness to the mare. They might have been doing a kindness to the mare, but they were doing a rank injustice to the foal. If the udder becomes overly distended the mare will give off some of the milk on her own accord. This is very definitely a time for man to let Mother Nature take her course.

In cases where foals have failed to have a bowel movement within six hours after birth it is a good practice to give them a warm water enema. A human enema tube and hose are quite satisfactory for such cases. Under normal conditions an enema of a quart of warm water will start normal bowel action. If the needed results are not obtained with one quart, a second may be used. In stubborn cases, and then alone, should one resort to the use of such things as castor oil and the like. The newborn foal's digestive tract is not strong enough to stand the harsh reaction that results from such purgatives.

It is remarkable the way the little foal will pick up in strength and spirit after he has nursed a time or two. That is exactly the way every horseman wants his foals to come along. However, precautions should be taken to prevent a few things which might happen to the foal. Most mares give a rather large quantity of milk at first if they have a liberal supply of feed. In many cases the foal will not be able to handle such a large quantity of milk and scours will result. It is for this

reason the recommendation is made to feed the mare lightly for the first four or five days. The first feed should come about 18 to 24 hours after foaling and it should be very bulky in nature. A wet bran mash is ideal. Grass hays that are clean and bright are quite satisfactory. Water should be available to the mare all of the time including the period between foaling and the first feeding. If the mare is in a good pasture she will eat the grass. This is natural.

Aside from keeping the foal's bowels in good shape and feeding the mare well, there is very little to worry about from this time on until weaning time. Permitting the mare and foal to be together at all times is natural and usually a minimum amount of trouble results if this is possible. However, in many cases the mare is needed for work. A mare may be worked two weeks after foaling if she is well and the foal is coming along in good shape.

If the mare is to be worked it is best to start using her lightly at first and gradually increasing the severity. What to do with the foal during the time she is being used is a problem. Some men permit the foal to go along with the mare. This does provide plenty of exercise for the foal and eliminates a great deal of fretting and worrying on the part of both the mare and foal. However, there is a possibility of some accident. If the foal is to be left at the barn, place it in a pen and stall that has no protruding objects in it. A solid walled box stall is the best because of the minimum opportunity for the foal to get his foot hung between boards and the like. Most foals seem to have an unusual knack for getting their feet or heads caught in something, especially if they are away from their mothers. Don't keep the mares and foals separated too long at a time. If the mare is hot and sweaty it is best to permit the mare to cool off before nursing. This will tend to eliminate possible digestive trouble with the foal.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUG. 24, 1912, AND MARCH 3, 1933

the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit: 1. That the names and addresses of the publisher, editor, managing editor and business manager are: Publisher, L. Bush-Brown, Ambler, Pa.; editor, L. Bush-Brown, Ambler, Pa.; assistant editor, C. Leavitt Dyer, Baltimore, Maryland; business manager, A. E. Heick, Ambler, Pa. 2. That the owners are: L. Bush-Brown, Ambler, Penna.; C. Leavitt Dyer, Baltimore, Md.; A. E. Heick, Ambler, Penna.
3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: none. Signed, A. E. Heick, Business Manager.
Sworn to and subscribed before me this 29th day of September, 1942 (Seal). J. A. Cassidy, Notary Public. [My commission expires at the end of next Session of Senate.]

State of Pennsylvania
County of Montgomery } ss

Before me, a Notary Public in and for the State and County aforesaid, personally appeared A. E. Heick, who, having been duly sworn according to law, deposes and says that he is the busines manager of the Farmers Digest and that the following is, to

Save Your Best Meat

Condensed from California Cultivator

E. W. Howes

MODERN methods of quick-freezing and storage of meats either in the home storage cabinet or a nearby locker plant, furnish a product which retains all the taste, quality and appearance of fresh meats.

The following simple rules and procedure should be observed most carefully to assure a final, high-quality product:

All meats to be quick-frozen should be healthy with ample fat covering. Veal dries out more readily than does fatter, more mature beef. It should be remembered that quick-freezing does not raise the quality of meats. You get out just what you put in.

A clean dressing job is essential. Bloody or contaminated meat does not keep well.

After slaughtering and dressing, meat must be chilled to 35 degrees F. immediately or it will spoil. Delay in chilling pork fat, for example, may result in rancidity of the frozen meat. The need for prompt and thorough chilling of all meats cannot be overemphasized.

Beef and lamb will be more tender if hung in the chill room (35 degrees F.) for a week or 10 days after slaughter. Enzymes in the meat soften up connective tissue during this period. The actual freezing also has a tenderizing effect. Pork, veal and poultry are not aged but cut, quick-frozen and stored after 48 hours chilling.

The carcass should be divided to meet requirements. Size of roasts, number and thickness of steaks and chops, amount of ground meat, etc., is easily adapted to family wishes.

Moisture vapor proof paper designed especially for wrapping meats to be frozen should be used. It is tough and inexpensive. Paper is a poor item on which to save money, since ordinary meat paper and waxed papers just don't have the characteristics needed. Each package should include the meat for one meal, or the quantity to be cooked at one time—such as a roast. It's wise to label each package as you wrap it, since all cuts look the same in brown paper.

After cutting and wrapping, meats should be put in the freezer immediately for quick-freezing. Foods should be frozen in a freezer where the temperature is

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at least as low as —10 degrees F., circulation is rapid, and the packages are spread out to assure rapid freezing. If foods freeze too slowly, a poor quality product, which will not keep for long periods, will result.

After freezing, foods should be stored at zero—not above—and the temperature should not be permitted to vary widely. Most frozen products will keep a year at zero except pork, which should be eaten within six months.

Quick-frozen foods may be held in the ice-making compartment of an electric refrigerator up to two weeks without damaging the quality of the food. Once thawed, however, frozen meats should be cooked immediately. Cooked frozen meats should be stored just like fresh frozen meats.

Frozen meats may be cooked satisfactorily with or without thawing, but don't let thawed frozen meats stand over a few hours before cooking. When frozen foods are served at the table, not even the most experienced connoisseur can tell whether they were frozen or fresh before cooking.

If these simple suggestions are followed, you will be able to keep the best quality meats in the world right on your own farm or ranch for enjoyment by your own family.

Treating Posts

Better than the use of old inner tubes for treating fence posts with zinc chloride is the trough method. Here's the general idea:

Green, unpeeled posts are stood in the zinc chloride solution within 24 hours after they are cut. The posts are put in top end down, and left for three hours, then reversed and left (bottom end down) for 24 to 28 hours.

Better, too, is the use of chromated zinc chloride; but that's out of the question now because of war restrictions on use of this material. In the meantime, use ordinary zinc chloride (trough method, at cost of around five cents a post) and make ordinary hardwood posts last three times as long. That goes even for maple, elm, hickory, beech, and other not-so-good post trees.

—*Farm Journal*

Butterfat Production and Income Over Feed Cost

Condensed from The Jersey Bulletin

S. R. Winters

THE United States Department of Agriculture has recently completed a comprehensive study of registered Jerseys, which shows the relation of butterfat production per cow to income above feed cost. The following table shows the results of that study, which included the yearly individual cow records of 4,384 purebreds:

Pounds of Butterfat per Cow	Cost of Grain per Cow	Total Cost of Feed per Cow	Income over Cost of Feed per Cow
155	$21	$45	$27
204	25	50	46
253	27	52	67
301	30	57	85
350	34	64	103
394	38	69	117
448	43	76	133
497	48	82	158
546	51	85	170
596	58	97	200

These yearly records were sorted into groups on the basis of butterfat production, the group centers being approximately 50 pounds apart. As a matter of fact, the group centers always vary from the theoretical average by a small margin.

As production advanced from group to group by fifty-pound jumps, the other figures advanced also. The increased cost of grain was generally about $4, sometimes a little more and sometimes a little less. The total increased cost of feed was generally about $5, and the gain in income over feed cost averaged approximately $18 from group to group.

The highest producing group had an average butterfat production of 596 pounds per cow, or almost four times that of the first group. The cost of grain for the highest producing group was $58, or almost three times that of the first group. The total cost of feed for this group was almost twice that of the first group. However, in spite of the increased cost of feed the highest producing group brought in an average income over feed cost of $200 per cow, which was almost eight times that of the lowest producing group.

Twenty cows like those in the highest producing group would bring in an income above feed cost that would add $4,000 to

Reprinted by permission from The Jersey Bulletin, Oct. 5, 1942, Indianapolis, Indiana

the farmer's bank account. To add that much to his bank account he would have to feed and milk 148 cows like those in the first group. The 20 high producing cows could be kept in a barn of ordinary size, but a barn that would furnish stable room for 148 cows would be a barn of tremendous size. Besides, it would require a small army of hired men to feed and care for such a herd of cows.

Let us also not forget that all we have to do to build up a profitable herd is to cull at the bottom and build at the top. When selecting a bull to head your herd, be sure that the average production of his daughters is above the average of your herd.

Beef Blood for Humans?

A vast new reservoir of supply for the nation's blood-banks may be opened as the result of experiments now under way at Harvard University, which indicate that plasma made from the blood of beef cattle can be used for transfusions in human beings.

The plasma has been developed by Dr. Edwin J. Cohn, professor of Biological Chemistry. Details of his experiments are a war secret. All work is being carried out under contract with the Committee on Medical Research of the Office of Scientific Research and Development, U. S. War Dept.

Wholesale tests of the beef plasma on 2,714 inmates of Massachusetts penal institutions showed favorable reactions, according to a publication of the American Meat Institute. "Use of beef blood would have several advantages over the use of human blood," the Institute reports. "It is not necessary to type the beef blood as is the case with human blood. Human plasma in 'banks' of human blood must be kept at lower temperatures than is necessary with the packing-house product. Supply of beef blood is practically unlimited, several million gallons being produced annually by packers."

Reports of the experiments as recently given to the Society for Experimental Biology and Medicine indicate that initial difficulties were overcome when scientists succeeded in separating the albumin content of beef blood from the hemoglobin. The new plasma will be particularly valuable in the treatment of shocks and burns.

—*Farm Journal*

Purdue Reports New Hog Facts

Condensed from Hog Breeder

C. M. Vestal

SIX pasture and seven dry lot experiments with mixed protein supplements for growing and fattening hogs have been completed since 1936.

The different mixed supplements containing fish meal consistently produced faster gains than those without fish meal, both in the pasture and dry lot experiments. The difference in rate of gain was greater in dry lot than on pasture.

Supplement C maintained a high rank in the pasture experiments because of its efficiency in producing rapid gains in the spring pigs, thus getting them off to an early market. The hogs fed supplement C in five tests had a market weight of 223 pounds when those fed the single supplement, meat and bone scraps, weighed only 207 pounds. Supplement C contained 20 pounds of meat and bone scraps, 20 pounds of fish meal, 40 pounds of soybean oil meal, 10 pounds of cottonseed meal and 10 pounds of linseed oil meal.

When Supplement C was modified in three tests, by including a simple mineral mixture in the place of linseed oil meal to reduce palatability, less supplement was consumed. This resulted in cheaper gains in all three tests, but slower gains in two of them.

Supplement E, which was like Supplement C, except that it contained 10 pounds more of soybean oil meal, but no linseed oil meal, was practically equal to Supplement C in producing rapid and economical gains in hogs on pasture.

Supplement 5 produced the fastest and cheapest gain in all seven dry lot experiments, and compared favorably with Supplement C when tested in two pasture experiments.

The simple mixtures of soybean oil meal and meat and bone scraps ranked next to those containing fish meal in the production of rapid and economical gains in hogs, both in dry lot and pasture experiments.

Feeding Suggestions

If fish meal is not available for use in the mixed supplements, use the simple mixtures of meat and bone scraps or tankage and soybean oil meal. Good mixtures in the Purdue test were:

Reprinted by permission from the Hog Breeder, Oct., 1942, Chicago, Illinois

"Supplement A" for Pasture Feeding

Soybean oil meal	50
Meat and bone scraps	50

"Supplement 2" for Dry Lot Feeding

Soybean oil meal	50
Meat and bone scraps	40
Alfalfa leaf meal	10

If meat and bone scraps and tankage are scarce and relatively high in price, use less of them and more soybean oil meal in these mixtures.

It is important to feed a good mineral mixture in addition to the mixed supplements and especially those containing the larger amounts of soybean oil meal.

Does it Pay to Use the Purdue Pig Ration for Fattening Hogs?

In two feeding tests on pasture and two in dry lot, the 70-20-10 Purdue pig ration, composed of 70 pounds of coarsely ground corn, 20 pounds of coarsely ground wheat, and 10 pounds of mixed protein supplement, fed with a mineral mixture produced rapid gains and good finish in fattening hogs, the same as was true for a fattening ration of shelled corn, mixed protein supplement, and mineral mixture self-fed, free-choice. From the standpoint of feed requirement and cost of gain, however, the pig ration was less efficient, both in dry lot and on pasture than the fattening ration. A greater wastage of the ground, mixed feed by the hogs at the self-feeder, the higher price for wheat than corn, and the cost of grinding both wheat and corn contributed to the more costly gains with the pig ration.

Feed Requirements and Costs for Different Stages of Growth in Pigs.

A test with 17 mature sows bred for 1942 spring litters showed a gestation feed requirement of 797 pounds per sow at a cost of $12.36. The ration contained 63 pounds of shelled corn, 32 pounds of whole oats, and 5 pounds of 60 per cent tankage hand fed with a mineral mixture self-fed.

The 17 sows farrowed 203 pigs of which 12 were born dead, 58 died or were accidently killed early in the suckling period, and 133 were weaned at eight weeks of age.

The pigs that were weaned had an average birth weight of 2.76 pounds, while those that died or were born dead had an average weight of about two pounds.

The sows weaned an average of 7.8 pigs, and required 855 pounds of feed per sow and litter during the suckling period at a cost of $15.79. The suckling ration for both sows and pigs contained 70 pounds of coarsely ground corn, 20 pounds of coarsely ground wheat, and 10 pounds of 60 per cent tankage fed with a mineral mixture. The sows

gained 96 pounds per head from farrowing to weaning time. The total feed cost per weaned pig from breeding to weaning was $3.60.

From weaning to 75 pounds weight, the average pig consumed 135 pounds of feed costing $2.54. The ration contained 65 pounds of coarsely ground corn, 20 pounds of coarsely ground wheat and 15 pounds of Supplement 5 (mixed protein supplement) self-fed with a mineral mixture. It required 295 pounds of feed to produce 100 pounds of gain on the pigs from weaning to a weight of 75 pounds. The total feed cost of the 75-pound pig was $6.14, without a deduction for the cost of the sow's gain or a charge for pasture

Soybean Oil Meal Is a Good Hog Supplement.

In three experiments with mature sows and spring litters, the average birth weight of the pigs was 2.73 pounds with soybean oil meal, and 2.62 pounds with tankage, supplementing the corn, oats, and mineral ration during gestation. The same sows weaned 8.6 pigs per litter on soybean oil meal, and 7.7 pigs on tankage, supplementing corn, wheat, and minerals during the suckling period. The sows receiving soybean oil meal weaned 75 per cent, and those fed tankage 68 per cent of their pigs.

The weaned pigs fed to a weight of 76 pounds gained as rapidly on a ration of corn, wheat middlings, and minerals supplemented with soybean oil meal as those with tankage fed as the supplement. On the basis of comparative feed requirements, the soybean oil meal was worth $72.40 a ton in these tests with weaned pigs when corn was priced at 80 cents a bushel, tankage at $80.00 a ton, wheat middlings at $35.00 a ton, and the mineral mixture at 2 cents a pound.

Growing and fattening pigs, started on test at 77 pounds average weight and fed to market weight in four experiments on alfalfa pasture, made an average daily gain of 1.79 pounds where tankage was fed free-choice with shelled corn and minerals, and 1.71 pounds when soybean oil meal supplemented the corn and minerals free-choice. In these experiments the soybean oil meal was worth $55.60 a ton when corn was priced at 80 cents a bushel, tankage at $80.00 a ton, and the mineral mixture 2 cents a pound.

In three dry-lot experiments, fattening hogs fed from an average weight of 126 pounds to a market weight of 232 pounds made an average daily gain of 2.02 pounds on tankage, and 2.06 pounds on soybean oil meal, supplementing shelled corn and a mineral mixture free-choice. In

these experiments the soybean oil meal was worth $63.00 a ton with corn at 80 cents a bushel, tankage at $80.00 a ton, and the mineral mixture 2 cents a pound.

Soybean Oil Meal Feeding Facts

Soybean oil meal is efficient and economical to use in rations for hogs of all ages.

The protein of soybean oil meal is of excellent quality which makes it serve well as a supplement to grain in hog feeding.

A good mineral mixture must be fed with soybean oil meal for satisfactory results.

A growing or fattening hog needs about two-thirds of a pound of soybean oil meal daily with a full feed of grain and minerals.

Soybean oil meal does not produce soft pork.

Feeding Suggestions

If hogs eat too much soybean oil meal when fed free-choice with grain, mix 100 pounds of a simple mineral mixture with 500 pounds of the soybean oil meal and then feed this mixture free-choice with grain.

A suitable, simple mineral mixture is 10 pounds of pulverized limestone, 10 pounds of special steamed bone meal, and 1 pound of common salt. Give the hogs free access to pressed block salt or loose salt when feeding this mixture.

For faster gains in hogs use the soybean oil meal in suitable mixed protein supplements. The following mixtures gave good results in the Purdue experiments:

Soybean Oil Meal in Mixed Supplements.

For growing and fattening hogs on pasture:

Supplement C

Meat and bone scraps	20 lbs.
Fish meal	20 lbs.
Soybean oil meal	40 lbs.
Cottonseed meal	10 lbs.
Linseed oil meal	10 lbs.

Supplement A

Meat and bone scraps	50 lbs.
Soybean oil meal	50 lbs.

For growing and fattening hogs in dry lot:

Supplement 5

Meat and bone scraps	20 lbs.
Fish meal	20 lbs.
Soybean oil meal	40 lbs.
Cottonseed meal	10 lbs.
Alfalfa leaf meal	10 lbs.

Supplement 2

Meat and bone scraps	40 lbs.
Soybean oil meal	50 lbs.
Alfalfa leaf meal	10 lbs.

Tankage can be substituted for the meat and bone scraps in these mixtures.

If fish meal is not available for use in Supplements C and 5 use Supplements A and 2 instead.

If tankage and meat and bone scraps are scarce and comparatively high in price, use less of these feeds and more soybean oil meal in the simple mixtures.

Buffalo Grass in Furrows

Condensed from The Nebraska Farmer

FRANS ANDERSON of Buffalo County, Nebraska, is trying what seems to be a "sure fire" method for getting hilly land back to buffalo grass. From a nearby, well-sodded buffalo grass pasture, he cut sod on the contour last May. On the badly eroded cultivated field he listed furrows on the contour, one for every foot of drop. The sod was cut in pieces, loaded on a hay rack bed and dropped into the furrows about six feet apart. The lister furrows were then harrowed lightly to drag some dirt around the sod pieces.

The furrows were intended to catch enough rain, even from light showers, to give the sod pieces a good sendoff, and that is the way it worked as nearly every piece is alive and growing in the very weedy, worthless field in which they were planted. In about four years, Mr. Anderson estimates, the field will be entirely grassed over. Meanwhile the furrows left in the pasture by the removal of the sod also catch the water on the slopes and are beginning to grass over without any permanent damage to the pasture.

Mr. Anderson is one of Buffalo County's 85 pasture-forage-livestock cooperators this year and the contour sodding is an outgrowth of his interest in that project. County Agent Howard Peterson kept a record of the cost for the sodding job. Here it is:

100 man hours @ 30c	$30.00
23.5 tractor hours @ 45c	10.60
4 hours for team @ 20c	.80
Total	$41.40

Eight acres were sodded, using 700 sod pieces per acre. Mr. Anderson will be eligible for an ACP soil building payment of $4.50 an acre or a total of $36, which leaves but little cash cost for the work.

Reprinted by permiasion from The Nebraska Farmer, Oct. 3, 1942

Kill Chokecherries to Save Peaches from X Disease

Condensed from Farm Research

D. H. Palmiter and E. M. Hildebrand

THE yellow-red virosis or X disease has been present in New York State for at least five years. During this period many peach orchards have been ruined because growers failed to remove the wild chokecherries growing near their orchards. Recent surveys show that other growers have kept their peach trees free from the disease by killing all chokecherries within 500 feet of the orchards.

Since most of the chokecherries in this area are now infected with this disease, it is useless to plant or attempt to maintain peach orchards without first removing this source of infection. Data from orchards under observation for several years indicate a very rapid spread thruout an orchard, with from 10 to 30 per cent of the trees showing infections with each succeeding year until by the third or fourth year the orchards are in such bad condition they are abandoned. While diseased trees may not be killed, the infected branches bear no fruit.

Once a tree has become infected it cannot be saved and may as well be removed from the orchard. Speedy removal of the chokecherries, however, often can save most of the remaining trees. For example, an orchard in Dutchess County with diseased chokecherries along one end showed 9 per cent diseased trees in 1939. No steps were taken to destroy the wild host that season and in 1940 another 11 per cent of the peach trees were diseased. Late that summer some of the chokeberries were killed by a herbicide spray, but many of the plants were missed. By 1941 a total of 29 per cent of the peach trees was infected. That season all the diseased trees were removed and the fence rows were given a thoro herbicide spray which killed practically all of the chokecherries were killed by a cleanup program only one diseased peach tree could be found in 1942.

The best method of killing chokecherries depends on their location. Where the land is open and can be kept under cultivation, that alone should be sufficient to destroy this plant. How-

Reprinted by permission from Farm Research, Oct., 1942, Geneva, N. Y.

ever, the chokecherry is apt to be found mostly along fence rows, stone walls, and rocky places where thoro cultivation is impractical. Under these circumstances the first impulse is to cut or burn the plants. This is a poor thing to do for the plant has a vigorous root system and such treatments, even tho repeated several times, have little effect in killing the plants and make them harder to kill by chemical means because the tops have been removed.

In general, the use of herbicide sprays appears to be the best way to destroy this host. One thoro application of an herbicide containing sodium chlorate or ammonium sulfamate at the rate of ¾ pound to each gallon of water will give up to 95 per cent kill of chokecherries if applied to the foliage in midsummer. The amount of spray required to cover 100 square feet will vary from 1 to 3 gallons, depending on the density and height of the plants and the type of sprayer used.

The leaves absorb the toxic salts of the sprays which are then carried into the roots so the whole plant is slowly killed. The tops of the sprayed plants should not be cut until two or three weeks later to allow sufficient time for the translocation of the toxic salts in the plants. Plants cut or burned over previous to spraying are harder to kill since the leaf surface has been reduced in proportion to the roots. Under these conditions a second application the same year or the following season may be required in order to kill any new shoots which grow from the roots which were not killed. In any case it is well to make an inspection every year since seedlings may continue to come up for some time.

Due precautions should be taken in using these chemical treatments. Sodium chlorate is somewhat injurious to live stock when taken in large quantities. Also, because it is an oxidizing agent, material sprayed with it becomes very inflammable so it is often sold as a mixture with other chemicals which reduce this hazard, but even so precautions should be taken to avoid fires. Ammonium sulfamate which is a new herbicide material is not toxic to animals and has a retardant action on fire. All spray equipment should be thoroly rinsed after being used for herbicide spraying to avoid corrosion to metal parts of the pump and to avoid injury to orchard trees the next time they are sprayed.

Advantages in Fall Calving for Beef Cows

Condensed from Capper's Farmer

BEEF calves dropped in November and December are more profitable than those born during other months, Rodger Blanchard has found. Since calving time was moved back, approximately 47 per cent of the calves have been born in November, 37 per cent in December and 16 per cent after January 1, the date when calving formerly started. The calves get grain in creeps as soon as they will eat it, have access to all they want until they are sold as baby beeves at 10 to 11 months old, and gain 2 pounds a head or more for every day they remain at the Blanchard farm in Ottawa county, Kansas.

"The smallest gain from birth to market since I started this management plan in 1925 was 2 pounds a head daily, the largest 2¼ pounds," Blanchard said. "It might be possible to make gains as good with calves dropped in spring, but the cost would be higher. That is the biggest advantage in fall calving. There are others, part of them peculiar to my farm-management plan, the remainder applicable anywhere in the northern half of the United States. Weather in November and December is better than in the subsequent 2 months; other work is slack then; the herd is quartered in lots where it is easy to get calves started to eating grain; cows go up in milk on grass when calves are large enough to utilize large quantities of it; and calves are old enough to make maximum use of grass when it is ready.

"The grain ration I have been using for calves is a mix of barley and Wheatland milo, bushel for bushel. I add 1 pound of cottonseed meal to 10 of grain. This then is mixed 50-50 by bulk with bran, and used until weaning time, after which the calves are finished on corn, which hardens them and makes them into high-quality killers."

Calves have access to high-quality alfalfa hay throughout winter. When they begin eating silage with the mothers, Blanchard gives them not to exceed 2 pounds apiece daily in troughs behind the creeps. Several carlots of the finished calves have proved good enough to get into the money at the American Royal Live Stock Show. Cows are well wintered on silage, pasture and straw.

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Old Corn into Beef

Condensed from The Farmer

WILL old corn—two, three, four years old—produce as good results in fattening steers as the most recent crop of corn? That question has been pondered by a good many cattle feeders. Some of the feeders have reported that the old corn had not given them as good results as newer.

The question is a pretty important one since we are on a program of storing corn for long periods. Eventually it must be used, and the main use is in feeding. So the Iowa Experiment Station at Ames set out to find the answer and here it is as reported by C. C. Culbertson.

The answer in a nutshell is this: If you are feeding something else, such as good leafy alfalfa hay, along with the old corn to make up for the vitamin A that it has lost through age, you will get as good results as with the most recent crop of corn, quality being on a par.

That answer is based on the results we got with 56 head of yearling steers which were fed for seven months (210 days). The steers were divided into seven lots of eight steers each. Five of the lot were fed and handled exactly the same except that one lot got 1937 corn, another 1938 corn, and the other three had 1939, 1940, and 1941 corn.

The feed consisted of all the shelled corn they would eat, fed twice a day, one pound per steer daily of linseed meal, salt self fed, four pounds of alfalfa hay per steer daily (this was fed in two feeds) and 0.75 ounce per steer each day of a mineral mixture.

On this ration the gains of the various lots of steers varied from 1.97 pounds per steer daily to 2.20—so close that the differences may have been due to not getting the steers divided evenly rather than to the difference in the age of the corn.

The margin per steer in the various lots (crediting the feed saved by the hogs) ranged from $21.78 to $30.63. The dressing percentage when they were sold in Chicago was exceedingly close—a range from 62.79% to 63.75%.

We had the corn of these various years tested for vitamin A content and found that the 1937, 1938 and 1939 corn contained only about half as much vitamin A as the 1941 corn. The 1940 corn had about three-fourths as

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much as the 1941 corn. After it was two years old, it was only about half as well fortified with the essential vitamin as the most recent crop, and from there on no appreciable loss in vitamin occurred.

We believe that unless you feed a good quality, leafy legume hay, not too old—ours was grown in 1941—you may not get as good results feeding old corn. But if you do have such a vitamin A supplement, then you can expect just as good results as with new corn.

Faster Milking Slows Mastitis

Whoever blames the milking machine for mastitis may be barking up the wrong tree. If the milking machine has anything to do with causing or spreading the disease, it is because the machine is not used right, or not kept as clean as it should be.

Right along the same line are results of some experiments (stretching over seven years) by A. C. Dahlberg at the Geneva station (New York). In the light of these experiments, faster machine milking looks like a partial answer to the mastitis problem.

When machines were left on the cows for ten minutes, mastitis troubles were frequent. When the time was cut down to only four or five minutes, the amount of mastitis and udder troubles was lessened. Moreover, the four-minute cows milked more uniformly throughout the lactation period, and there was considerable saving in labor.

The plan of milking with machines in the Geneva herd is about as follows:

All first-calf heifers are started on the four- to five-minute schedule. Older cows in milk, to be shifted to faster milking, gradually have their milking time reduced. When the cows become accustomed to the four- to five-minute milking schedule, no more stripping is necessary than before. Only about one cow in eight or ten is now stripped in the Geneva herd.

One operator with two single units milks about 20 cows an hour. This time includes wiping the udders, putting the machine on, taking it off, stripping if necessary, weighing, and dumping the milk. Say the Geneva dairy folks: "A clock or some kind of timing device should be used to determine the period that the machine is actually on the cow."—*Farm Journal*

Forty-Bushel Wheat from a Blow Field

Condensed from The Western Farm Life

Duncan Scott

FOR nearly a quarter century, the silt loam soil on a field of 395 acres shifted before winds that swept the plains of eastern Colorado. Earth piled high in hummocks, and the field remained one of the "sore spots" of the former Dust Bowl. Crops were so poor they weren't worth harvesting.

Only a few weeks ago, on this same field, Orin P. Penny, business man and farmer of Burlington, harvested 15,100 bushels of wheat, or nearly 40 bushels to the acre. Back of this remarkable contrast is a story of terraces and of a shrewd farmer-business man who knows that soil conservation pays in increased yields and reclaimed land.

If you go to Burlington, you may find Penny in his hardware store. But, more likely, you will see him somewhere on his land, for he operates nearly 5,000 acres of range and 3,000 acres of cultivated land in the vicinity of Burlington.

When William H. Gunther, district conservationist at Burlington, and I found Penny, he was driving along one of his corn fields in a pickup.

"Just look at that corn," he beamed. "Ever seen anything finer? All on the contour—some of the rows 2¼ miles long."

"Fine corn, Mr. Penny, but we wanted to talk to you about your 'blow' field—the one that yielded 40 bushels of wheat to the acre this year."

And this is the story of an abandoned field brought back into production at a time that our country needs every extra bit of food that can be raised.

Built Terraces in 1941

The field, which lies 5 miles south of Burlington, has slopes varying from 1 to 6 per cent. When Penny bought it 2 years ago, the tract was owned jointly by five people, most of whom had long ago moved from the community. Some say the field hadn't produced a crop in 25 years—others say not quite so long as that. But everyone agreed that the blowing soil was a constant menace to nearby farm land.

In 1940, Penny tried sorghum, but without success. Then he realized that he had to do one of two things: Either revegetate the land and return it to grass, or use a mechanical treatment that

Reprinted by permission from Western Farm Life, Oct. 1, 1942, Denver, Colorado

would stabilize the soil and hold rain water. Since he is a co-operator in the Smoky Hill soil conservation district, he asked the advice of SCS men. They suggested terraces and contour cultivation.

Terraces were built in the spring of 1941—broad base terraces, 30 feet wide and 15 inches high, at intervals of 150 feet. The field was summer fallowed in 1941 and wheat was planted last September. It should be remembered that the average annual rainfall around Burlington is only 17 inches. This means that water must be held on the land if a permanent type of agriculture is to be carried on.

Experiments of the past 15 years at the Hayes (Kansas) Experiment Station have shown the necessity of having sufficient ground moisture. With 3 feet of moist ground at planting time, the wheat farmer will make a crop 9 out of 10 times. With only 1 foot of moisture, the chances of raising a crop are just 1 in 10.

Last year 24 inches of rain fell at Burlington. At the time of planting, Penny's soil auger showed more than 6 feet of moisture in the ground. The terraces had done their job! They had held the water—had let it soak slowly into the ground.

Some farmers oppose terraces on sloping fields because they claim the structures make it difficult to use heavy machinery. But Penny knows better. "I used a 15-foot combine on that terraced field," he said, "without the least bit of trouble." Every year, after harvest, to keep his terraces strong, he will have them back-furrowed with a one-way plow.

He is entirely "sold" on soil conservation, partly because he knows that scientific farming is good from a business standpoint.

"Just look at that soil," he said. "Feel the moisture. Why, if everybody in this country cultivated on the contour, we'd have seepholes inside of 10 years!" This was pure Western exaggeration, of course, but it sounded good anyway, coming from a land that was once in the Dust Bowl.

Penny, who was reared on a farm in Missouri, moved to eastern Colorado in 1917. Gradually he has added to his land holdings, until today he is one of the largest operators near Burlington. Most of his cultivated land is planted in feed crops—corn, sorghum, wheat and oats—which he uses in fattening 500 to 600 steers each year. He is also raising 60 hogs and 75 cows.

Being a good business man, he doesn't want to be caught short of feed in a dry year. This year he will probably harvest about 50,000 bushels of grain. In addition, he already has 800 tons of silage packed away in a trench

silo and 500 tons in a circular, concrete pit silo.

"What about labor?" he was asked. "Any difficulty in getting workers?"

"Labor is a bit short, yes, but I've had no real trouble," he replied. "You see, I've raised wages $20 a month over last year. Each foreman has a house, a milk cow, chickens and a garden plot. I've found out that paying good wages makes a lot of labor troubles disappear." He operates on such a large scale that he runs two shifts of workers in the spring planting season. One shift comes to work about 4 o'clock in the morning and works until noon. Another reports for duty after noon and works until 9 or 10 o'clock at night. In this way, he can keep his machinery overhead to a minimum. He also takes excellent care of the two combines, four trucks, four cultivators and other machinery on his ranch. He believes it's better to correct minor flaws before they become major mechanical faults.

Penny likes the West because he can farm in large land uits. Back in Missouri, they speak of the "lower 20" or the "upper 40", but this man talks in terms of sections. Six hundred acres of corn, 500 acres of wheat, 320 acres of barley, 160 acres of oats, 1,000 acres of sorghum, and so on.

But, aside from all these things, Penny has proved once more that a farmer must be a good business man to succeed. And much of his recent success he attributes to soil conservation measures that are holding his soil and increasing crop production at less cost.

How Turkeys Are Raised Successfully

Condensed from American Poultry Journal

G. T. Klein
Massachusetts

TURKEY raising has become a much less hazardous undertaking during the past decade. Losses still exceed those of the poultryman, but the progress has been encouraging. Diseases have been brought so well under control that hundreds of farms are now raising both turkeys and poultry successfully. In fact, there are so many ways of making double use of brooding equipment that the combination is likely to be a profitable one.

This does not mean that blackhead and the other maladies of turkeys have ceased to appear. They have, on the other hand, been brought under reasonable control because the nature of the diseases is better understood. Turkey raising in recent years has been rather profitable, and unless new troubles that are extremely serious appear, it should be smooth sailing for turkey growers in the years that lie ahead.

It is hardly safe to attempt to raise turkeys without starting them on sunporches. The first 2½ to 3 months on wire or slats is long enough, though they can be raised from start to finish in confinement. Brooder houses 12 by 14 ft. are about as nearly ideal as can be built, though double size units 14 by 24 ft. will perhaps save some labor. They will take two stoves and two complete brooding units of 150 poults each. These units are also ideal for brooding chicks or for raising winter broilers, whichever is desired.

Brooder houses for turkeys can be made of rough native lumber. Construction costs can be comparatively inexpensive, and since most of the poults are started late in the season, insulated houses are seldom used. For tightness of construction, roofing paper or battens can be used to windproof the house.

The war shortages have brought about some brooding changes. Heavy gauge wire, so long held to be absolutely essential for the floor of the sunporch, has now been replaced with one inch or larger wooden strips. The best spacing of these seems to be 1 inch. They are rigid, if well

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supported from below, and seldom sag with the weight of the turkeys or by the attendant walking on them. For turkey breeders or for turkeys held on the sunporch beyond the three months age, strips 1½ by 1½ inches spaced the distance of the strip is better sunporch construction. Possibly we shall continue to use the strips because they are more popular with the turkeys and seem to give less leg and foot infection from bruises and less bone trouble. Many growers say that even if metal were plentiful, they would prefer the strips. These same strips make an excellent water stand, and may also be used to advantage over droppings pits where the pits are used in the turkey house.

A sunporch the size of the brooder house is not adequate in size for raising turkeys to maturity in confinement. This allowance gives but little more than 2 sq. ft. to the turkey. Feather picking becomes so bad under confined conditions if the flock is crowded that the sunporch and brooder house space must be increased to an allowance of about 5 sq. ft. to the turkey. This is usually provided by constructing additional sunporches which are partially covered with a roof.

Blackhead losses are likely to be lower on sunporches, but leg trouble and bone deformities may run much higher. Feather picking and the accompanying "blue backs" are almost certain to run higher on the porches. Confinement does, however, offer advantages in disease control on the farm where turkeys and chickens cannot be kept separate. It has to be carefully analyzed, for it has both advantages and handicaps. An overwhelming majority of turkeys are raised on range and probably always will be.

Higher mortality in early turkey brooding is due in part to trouble in getting turkeys started on feed. Chick size grain fed on papers and from feeders for the first three days is an excellent starting method. It carries us back a generation in feeding methods. The system saves some poults that might not learn to eat on the mash system and it gives less bowel trouble and pasted-up poults. After the third day, grain feeding is stopped, and poults have only mash on a normal feeding program.

After poults are given a good start on a high protein feed for an 8 week period, they can then go on a ration running lower in protein. The growing ration can also be fed with grain after the 8 week period. The grain can be self-fed as well as the mash. Corn and oats are the best grains, and these along with mash, should be fed from separate hoppers. Oats are particularly important in the turkey diet and will give better

bone growth and less feather picking. At 8 to 12 weeks, little grain is eaten, but it rapidly increases until cool weather, when the ration, as they choose it, consists largely of grain. There is no better fattening food than yellow corn.

Litter eating by poults is a rather common vice. It is overcome by covering the floor with burlap or papers for the first week. There is no better litter than clean sand covering the floor to a depth of 2 to 3 inches. Shavings, straw, shredded cane, peat, sawdust, chopped hay, and ground corn cobs are all satisfactory litters.

Feather picking is a costly vice. Feather folicles are injured, and ink which they contain is spread under the skin. These birds then sell only with difficulty and at a reduced price. There are bits and other anti-picking devices on the market that are very effective, but these are usually to be recommended for use only on the sunporches or on crowded ranges and in pens. They interfere considerably with the eating of grass and greenfood.

On range, there must be constant guard against disease and enemies. Blackhead, with its spotted liver and sulfur colored diarrhea, may appear at any time. Infected birds should be taken out of the flock and killed, or put on a wire floor. The flock should by all means be moved to a new range. Blackhead seldom causes serious losses if the flock is moved once a month. The milk flush used in treating for coccidiosis is often used for a blackhead flush. Usually one day feeding of a mash carrying 25% dried milk products gives a good flush.

In the Northeast, foxes are a serious turkey problem. The electric fence has greatly helped to keep them as well as dogs off the range. The wire is run along the outside of the fence about 6 inches from the ground and 6 inches from the fence. Weeds are cut and sprayed with equal parts of kerosene and creosote or some other good weed killer. Two sprayings a year will usually hold weeds under control, but their growth must be prevented, as this will short the circuit.

Stampeding of turkeys at night is not much of a problem if searchlights or flares are burned. These lights, however, are not permitted in areas affected by the dimout. Lights tend to keep animals away and they enable turkeys to find their way back to the roosts after the stampede. Turkey flocks can also be protected at nights by driving them into wire enclosed and wire covered roosting quarters. This lacks the disease protection of clean range for roosting quarters.

In Massachusetts, fully 65%

of the turkeys are dressed at home and sold retail. This is by far the most profitable method, but will be curtailed by rubber and gas shortages for the duration. In home dressing, drypicking is the safest, but for the turkeys immature in feathering, the semi-scald is easier and faster. The safe temperature is 126 for small turkeys and 128 for larger ones. Time is 30 seconds for all birds. Semi-scalding should be accompanied by covering the turkeys with dry sawdust for a few seconds to dry the feathers. This makes picking easier and faster. Both the mechanical picking machines and waxers can be used to advantage on the larger of the specialized turkey farms.

Holding temperature and length of time of holding turkeys on farms after killing are two of the problems that need attention. Turkeys need to be chilled immediately after killing, either by hanging in the cool air or in ice water. If they are to be eviscerated and frozen, this should be done within 30 hours after killing. Turkeys are too often held in the fresh killed condition for periods ranging up to 30 days or longer. There is an oxidation of the fat and a development of odors in kidneys and drumsticks that give a fishy flavor and strong taste. When the time comes that most of the turkey crop is hard frozen, eviscerated or rushed to market in the fresh condition, consumption will increase, because then there will be few of the off-flavored birds. Fish oils, too, must absolutely be withheld for a period of 2 or 3 months before killing.

My First Year in the Baby Beef Club

Allen Brakke

Milroy, Minnesota — Prize Essay Winner

ADMITTEDLY, it is an impossibility to ascribe a numerical valuation to the benefits of a 4-H Club project. In this discussion, however, it is my endeavor to choose from my years of 4-H experience one project which best exemplifies the benefits of a 4-H Club project. As an example, I wish to cite my experience in carrying out a project in Baby Beef production, which I completed two years ago.

I am choosing this project, not because it brought fabulous financial returns in the form of prize money and premium prices when sold, not because it brought national or even state honors, although I have carried projects which have brought these—but because, through the successful completion of this project, I more keenly than ever before came to realize the true values of a 4-H project—came to realize how it develops a real and lasting interest in agriculture; in people about you, through the social activities of the club; emphasizes, as it does, the character building qualities which are developed through the day-by-day struggle and endeavor to successfully complete the project.

I selected for my Baby Beef project a Hereford steer from a neighbor's feed lot. Inexperienced as I was, I had to ask him for assistance, and through his help it was at this time that I first began to have an appreciation and understanding of beef type as related to production. This experience stood me in good stead later on when I enrolled in the livestock judging project, and the practical application of it came when I helped my father select feeders for our own feed yards. Needless to say, my interest in beef cattle, their feeding and management grew. To the end that I might better care for my calf, I procured and studied thoroughly all the government bulletins and material I could find on the various phases of beef cattle production, and so increased in knowledge and experience on this subject.

But now to look into the very practical side of the project.

I paid $11.00 per hundredweight for my calf, which was at that time top market price. This meant a total expenditure of $33.22 for a weight of 302 pounds. I fed my calf in accordance with a well laid plan ar-

rived at after studying my, by now, great reserve of information on the subject. Throughout the feeding period, I, of course, met with various reverses; these I resolved not to let happen again and so I persevered to the end. I then began to summarize my records to ascertain the degree of success or failure of my project in a practical sort of way. Throughout the 240 days my calf was on feed, he gained a total of 696 pounds, or an average of 2.9 pounds per day. To make this gain, Near Perfection I, which was the name I bestowed upon my calf, consumed the equivalent of 7 bushels of corn and 425 pounds of commercial protein supplements, varying in percentage of protein from 42 to 18. Also, he consumed ½ ton of roughage consisting of equal parts of alfalfa and wild hay.

The total feed cost based upon prevailing market prices in this vicinity was found to be $42.25, or $6.04 per hundred pounds of beef produced.

Labor costs, shelter, etc., were offset by the value of the manure produced. Net returns from the project were $49.28, with returns per $100 of feed fed being $125, which proves there is money in feeding cattle when conditions are favorable. These efficiency factors when compared with those obtained from farms in one of the Minnesota Farm Management Routes showed that my project was considerably above average efficiency, both as to feed fed per hundred 100 pounds of beef produced and also to returns per $100 feed fed. The above figures, of course, do not include prize money won and the $1.50 premium per hundredweight received when sold. These figures were withdrawn so as to prove to myself the profitableness of conducting such a feeding venture under ordinary farm conditions.

I carried out this project with as much efficiency and skill as my limited experience would permit. I also conducted it on as practical a basis as possible, expensive mixed proprietary feeds, as well as nurse cows having no place in the feeding program. Success was achieved as a result of skill and efficiency in the mixing and feeding of the daily ration, and not gambling on high returns through above average expenditures. "The eye of the master maketh his cattle fat," became the byword by which I managed this calf. That I fared well for a beginner in this endeavor was well borne out by an analysis of the above efficiency factors of production.

Since this first beef project, I have fed a number of beef calves, some being entered in 4-H Club projects, others not. All proceeds from these calves have been invested in more calves un-

til today my total investment in beef cattle represents a considerable sum. But as I said at the outset of this article, I have chosen this project not because of fabulous financial returns, but for returns which cannot be measured in terms of money.

It was while I was carrying out this project that I first began to feel a real and deepening interest in agriculture. Previous to this, I was indifferent to the farm, believing my work lay in other pursuits than farming. However, as I progressed in my project, I became more and more interested in farming, especially in beef cattle, and at last fully conscious that this was to be my life work. At the present time, as a result of this first project, I now have an enviable start in the beef business.

And so aside from the vocational value, which is inestimable, gained as a result of this project, aside from the value of social associations and activities which are equally valuable, remains another value which I think is best expressed in a statement which is to be found at the close of the story of that first baby beef, which I handed in to our County Agent at the close of the project, which statement reads as follows: "And while the financial remuneration which I may receive from the sale of this calf will soon pass away and be forgotten, not so will be the memory of pleasant hours, replete in satisfaction and happiness, spent in taking care of my calf, which will forever linger in my memory."

And so in conclusion, my experiences in this project have not been unusual in themselves. For in like manner, thousands upon thousands of 4-H Club members over the length and breadth of this great land have had similar experiences, either to a greater or lesser degree, contingent upon what effort they put into their projects.

And so the 4-H Club carries on, training young men and young women today, to take their place in agriculture and in the world tomorrow—teaching them not only how to earn, but how to live as well.

Home Butchering Is Economical

Condensed from Pacific Rural Press

D. M. Rutherford

ACCORDING to cold figures home butchering is economical. Perhaps even more important than cash savings is the assurance of a supply of meats, and provision for an adequate diet.

Sleeter Bull of the Illinois Agricultural Experiment Station made a talk at the recent Illinois Farmers Institute and relays the figures to us. In his discussion he quoted USDA to the effect that a family of five needs four tons of food a year for adequate nutrition: 1525 quarts of milk, 125 pounds of butter, 125 dozen eggs, 1000 pounds of flour and cereals, 500 pounds citrus fruits and tomatoes, 1800 pounds of other fruits and vegetables, 300 pounds of sugar, 65 pounds dried peas, beans and nuts, 175 pounds of lard and 675 pounds lean meat, poultry and fish. Obviously the less of this food going through processing plants and central markets the better.

There is no reason why practically every farm cannot produce its own milk, butter, eggs, poultry, potatoes, tomatoes, vegetables, beans, peas and most of its fruits, lards and meats. Not only is it patriotic but it is economical to do so.

How much can be saved by farm butchering and storing the meat in a locker? To supply 675 pounds of meat would require three 225 pound hogs, half of a 1000 pound steer or heifer, and about two dozen chickens. The hogs would supply 96 pounds of lard, leaving a deficit of 79 pounds to be bought.

A 225 pound hog, at 12 cents per pound is worth $27.00 on the farm. On the same price basis it will cut out at retail about $38.85—higher lately with skyrocketing prices. Taking out locker rent, processing costs, the saving on the year's pork supply would be about $20.55, at a minimum.

One beef carcass is too much for one family, but two families could go together and slaughter a steer or a heifer. A 1000 pound steer at 13 cents per pound is worth $130 on the farm. If slaughtered on the farm the offal —hide, heart, liver, fat, etc., is worth about $13.20; meat cuts at corresponding retail prices would bring $166.71, $179.91 for a $130 steer. Each farmer would

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have 265 pounds of meat on his hands. Less locker and processing charges there would be a net saving of $13.57 on a side of beef —probably more at this writing.

Savings on three hogs and a side of beef would total $34.12. In addition the family is assured of a supply of healthful meat of high quality and is releasing trucks, freight cars, machinery and labor for the all important purpose of winning the war.

Pasture Planning Dividend

Careful management enables Frank Hall to pasture 20 milk cows from April 15 to October 1 on a farm of 22 acres in Parke County, Indiana. He first turned the herd on 6½ acres of rye and left them until May 1, when they went to 7 acres of knee-high wheat. The rye was plowed down and the land seeded to sweet clover, which was to have rye drilled into it as a mix to give heavier carrying capacity and longer grazing the next season. The wheat provided 31 days of pasture, then was plowed down and seeded to Sudan as the cows went to 8½ acres of oats that nursed a seeding of brome and alfalfa. The brome-legume mix was seeded for heavy carrying capacity and a long grazing season the next year. The oats and seeding was eaten down in 28 days, by which time Sudan was ready to feed the herd until frost.

Hall rents 42 acres of tillable land on which he grows hay and other cow feed for winter. He lets fertilizer increase crop production, and feels there is no better place to use it than on pasture. The wheat had 200 pounds of 45 per cent superphosphate an acre. The oats had a similar application and 8 tons of manure an acre to give the brome-alfalfa seeding a good start.

Hall is convinced that a 50-50 stand of brome and alfalfa, a mixture widely used in Michigan, will prove his best pasture producer. It continues growth over a long period, yields high, and provides grass with exceptionally high feeding value. Many Michigan dairymen get on with little or no protein supplement in the grain ration during the first half of the grazing season because alfalfa is a high protein legume and brome one of the highest protein blade grasses.

—Capper's Farmer

Join the War on Rats

Condensed from Poultry Tribune

George W. Dyar

ONE morning last winter, Bill Patience opened his barn door to find 350 dead rats strewn about on the floor. That is not an everyday occurrence, nor was it an accident.

Bill had planned carefully for that kill. For two whole weeks he had fed them each night with tempting pans brimful of milk, fresh and warm from milking . . . set them right out on the barn floor. The suspicious rats refused to drink until the fourth night. In a week they were cleaning up nearly a gallon and a half. The fourteenth night they consumed *two and one-half gallons* of milk. The fifteenth night they came to drink as usual. This time strychnine had been added to the milk and that is how Bill came to pick up 350 fifth columnists with one trick.

Bill had learned the most important single feature to assure a successful kill of rats by poison. Find out what they want, then give them plenty of it to make certain every rat on the premises partakes of the feast. Clean, unpoisoned food must be accepted by the intelligent animals before they can be expected to eat it with poison added. The type of poison is less important than the food bait you use. Some rats prefer melons, some will eat only figs, others like chicken broth. Tempt them with a variety of foods, then concentrate on the food most widely accepted.

Care should be used to PRE-BAIT in all buildings on the premises at one time. Don't warn the rats in the barn by exposing poisons only in the preserve cellar under the house. Rats are smart! We've found that the old fellows let the youngsters try the suspected food first, then they watch them to see if they get sick. Do you think the older ones will touch the food if the children complain? Nothing doing!

The method of making up baits varies greatly. In general, dry or slightly moist baits (the latter are better) are more quickly accepted if made in small packages similar to candy kisses and the same size. Rats love to steal things, running off with a tempting morsel of food and eating it in private, even storing it for future feasts. One need not fear handling such baits for the rats know our smell; it's our tricks they fear. A basketful of such baits can be made up fresh each

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afternoon, say 75 or 100 from two or three pounds of hamburger (that woodchuck down in the lower 40 will make just as good hamburger as a forequarter of steer). A string of suckers from the meadow brook makes fine rat bat—use it raw and ground up. Each morning pick up old baits, destroy and replace with new ones *in exactly the same locations* that evening.

Many methods have been used to protect chickens or other animals, from getting at the poisoned baits. Baits may be placed under boxes or behind boards leaned lengthwise against the wall. Exposure of poisons in the dropping pits, if they are screened, reduces the hazard to the birds. Red squill may be mixed directly into mash or dry grain since the birds will not touch it anyway.

On any premises where poisoning is to be done, all food sources should be covered or placed where the rats cannot get at them. You want the pests to eat only the prebait you put out each night and be so hungry that they dive right into the poisoned food when you finally expose that. For this reason, one of the hardest places to poison rats is in the grain room. Other controls may have to be used there.

Never attempt to poison rats above the basement of your home for the animals may die in the walls before reaching their burrows in the ground. There is always the chance of a bad odor following a poisoning campaign against rats. Deodorants may be used to offset such unpleasantness in most cases.

Any poison, including red squill, may kill other animals; the squill at least will make them very sick. So be careful of your pets. Expose the baits containing poison for only 36 hours, then pick up and destroy them. Keep your pets confined during the exposure period.

Admittedly, poisoning is the most practical method of destroying the present group of rats on any farm. Used carefully, one need have little fear and should not hesitate to make full use of this important method of controlling these pests. True, many sections of the country are experiencing difficulty obtaining effective poisons for rats. Armament manufacture is absorbing the common poisons, and the future promises even greater shortages. Caution should be used when purchasing raticides, especially red squill products, that only those of proven worth are obtained.

Manufacturers of the more reliable rat poisons have studied carefully the best methods of applying their products and the directions on the containers *should be followed*. Few of them recommend prebaiting as such a

suggestion might make their product seem difficult to use. However, *prebaiting is well worth while,* as Bill Patience discovered.

Visiting rats, before they become familiar with and established on the poultry farm, may be caught by use of traps, properly set. There are all kinds of traps from those costing a few pennies to complicated "electric chairs" and gassing chambers costing a hundred dollars.

In the first place, it is not necessary to wash the human odor from rat traps. After all, rats live with us. Everything they travel over about the farm or home smells of humans. They are not afraid of our odor, but they are very much afraid of our tricks. Traps that have caught rats may be said to have been broken in and will catch more rats quicker than new traps.

The next important feature is to use plenty of traps and this is one good reason for using the common wooden base snap trap selling for a dime or so. If you are bothered with rats, and what farm isn't, get a couple of dozen of these traps, at least. Age them, then cut a small square of corrugated cardboard about two inches on a side, force the metal trigger of the trap between the layers of cardboard to make a bigger trigger.

Now, set the trap and carefully *place it against the wall* at right angles, with the trigger end touching the wall. Now move up that old box and place it about two inches from the same wall and touching the trap. See what you have? A runway for the unsuspecting rat which comes sneaking along the wall. The piece of cardboard looks harmless and doesn't smell of food so he steps on it . . . for the *last* time. No, you don't put any bait on the trigger! So you don't have to keep replacing baits. Of course, every time you catch a rat, take him out and reset.

Baits quite often attract rats to traps, but by the same token, they warn away the experienced rats. When Old Joe gets his tail caught in a bacon-baited trap and gets away with most of his tail, he heads straight back to the gang and tells them to keep away from bacon . . . *it bites.* However, bacon, frizzled a little in the fry pan and tied to the trigger is quite attractive to the younger set.

You'll get better results when using your wire cage traps if you bait them, but leave the back door open and place them over against the wall under an old burlap bag. Traps always go against the wall for rats normally travel with their whiskers on one side touching the wall or other solid objects. After the rats have eaten several feedings from the

harmless trap, then bait and close the door. Keep one of the rats you catch alive for a decoy and he'll call other rats into the trap next time.

There's a way to set traps in the pens so you won't catch your prize biddy by the neck. Haven't you noticed the rats scamper up the studs and timbers of the barn . . . run right up the straight woodwork? Well, there's right where you should nail a trap, up on the stud five feet or so from the floor. Put a trap on every stud they run up, but if you have rats that run all the studs, as I've seen them on some farms, you might go broke buying traps. Just put a ten-inch strip of metal (an old oil can will do) around those timbers they don't use so often. Nail traps wherever traffic is thickest.

One clever trap trick is to half fill a steel drum with mash or grain and let the rats feed in it for a week or so. Then some evening, dump the grain out, replace it with water and sprinkle a little of the feed carefully on the water surface. What a surprise the rats get when they jump in! Of course there are countless other trapping tricks.

Another weapon against rats which is somewhat unique is a fish spear or gig, as Ohioans call it. It's simply a three to five pronged steel spear with points like fish hooks, sold by most hardware stores. A five-foot handle makes this a very effective weapon to jab into rats at short range. One poultryman, "down east," speared 54 rats in two weeks time in his small remodeled barn. When you spot a rat on a rafter, saunter over to him and jab the spear home. I admit, it's not very pleasant, but certainly there is a sense of satisfaction from such quick death to man's worst animal pest.

The exhaust of an automobile, piped through a garden hose into crevices in rock piles, under brooder houses and between hollow walls, quickly disposes of any rats. Of course, the dead animals must be removed from the walls. Commercial gas products using chemicals such as cyanide are also very effective. Rats in exposed corn cribs may best be controlled by gassing. However, if you build them out of the crib to begin with you save yourself the headache of keeping them under control the rest of your years.

For those who use guns to destroy rats, there is the suggestion that a .22 cartridge loaded with *shot* (not to be confused with *shorts*) is available. About 75 tiny pellets will plaster the rear end of a rat so he'll run for a week, if they don't actually kill him. You don't have to be a crack shot and you may get three or four rats at a time, if you are

lucky. Most of the large hardware stores and some of the mail houses carry them. Larger bores create danger of ricocheting lead, and blasted equipment and property, besides being more costly to use.

One New England poultryman rigged up a heavy block of wood hinged to the floor over a rat hole so that by pulling a string just outside his kitchen door, the block dropped and prevented the escape of the rats from one of his large poultry pens. He claimed he actually killed 75 rats in one evening. He'd closed several other holes the rats used and let them get accustomed to using the one hole. The rest was simple and *very effective*. That's called "blocking." It works fine in an otherwise ratproof grain room, for instance. Leave the door ajar, rig a line to the yard and wait. Pull the string and start killing.

Poultrymen must wage a constant fight against rats with *all* the tricks of the trade, for remember "in your rat infested poultry buildings, at least 18 cents of *each* hen's annual production goes to support rats!" Don't be fooled because you only see a few rats running around occasionally, for you see only about one in five of all of them at any one time. A few dollars put into ratproofing is well spent. Such money used for traps, good poisons, a .22 rifle and cartridges, etc., helps to reduce your losses from rats, but without ratproofing you'll be doing it year in and year out till your days are ended.

Farm Ponds

Condensed from Missouri Ruralist

Cordell Tindall

HOWARD county livestock owners always have relied heavily on ponds as a source of water. Old-time drawings of farmsteads for the Howard county atlas and plat book always included several ponds, with ducks and a rail fence as a necessary part of the picture.

But the drouth years like 1934 and 1936 played havoc with these attractive, but inadequate, ponds. They were small and shallow and soon dried up and water was at a premium. The government came in and built a number of drouth-relief "lakes" then. To those fortunate enough to have one of these constructed on their farms, their water worries were over.

Now a real program of pond building is under way—on individual farms. Some of the biggest and best ponds under construction have been planned by the Soil Conservation Service. But, in addition to these ponds on demonstration farms, many individuals have constructed good ponds with modern features that make them one of our best sources of stock water.

Especially evident in the Howard county ponds are their increased water capacity over old-type ponds. They not only are larger with larger dams, but they are much deeper. A deep pond does not lose as much water by evaporation as a large shallow one.

Another outstanding new feature is that all ponds are fenced, with the creation of a small wildlife area around them. The watersheds are adequate and protected against erosion. Water for stock is piped to a tank below the pond. Stock, therefore, never drink from the pond directly.

Before locating a pond, a site should be chosen that will allow drainage from only clean pasture or meadow land. If drainage from cultivated land is included, this land should be properly terraced and the outlet well controlled. Water from barnyards should never be allowed to drain into stock ponds.

A common tendency is to locate ponds far down the slope in gullies or natural waterways that carry water from a large drainage area. This often leads to excessive silting of the pond and the necessity of controlling the spillway by mechanical means.

Many old pond dams that are

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rebuilt give unsatisfactory service because they develop seeps thru the dam and lose water rapidly. To prevent excess seepage losses it is first necessary to remove all vegetation from the top and sides of the old dam, so that a satisfactory seal between old earth and new may be obtained.

Spillways must be repaired when sod in them is destroyed and small washes start, or gullies will result which will eventually drain the pond. Rodents are a continuous threat of destruction to pond dams unless the owner is alert in controlling them and is timely in repairing damages. It is important to keep the dam free from tall, heavy weeds and brush as this is inducive to rodent inhabitation.

Fish thrive in the cool, clean water of stock ponds, and several varieties such as yellow catfish and black bass may be stocked.

Brush Industry Needs Bristles

Curtailed imports of bristles for use by the brush industry of the United States have caused a growing demand and urgent need for bristles from domestic hogs, the Department of Agriculture said recently. As a result, there is a potential market for practically all the bristles that the swine industry can produce. Vast quantities of brushes are needed by the Army and Navy, for painting barracks and ships, and for other military uses. Brushes are needed also for essential civilian and industrial purposes, such as in the manufacture of woolen goods where bristle brushes are an esential part of wool combing equipment.

Bristles that bring the highest prices are those ranging from 3 to 4 inches long, which are best obtained from the middle of the necks and backs of mature boars and sows. The bristles can be removed from live animals by the use of clippers or scissors, and will grow out again to provide another supply.

Well-bunched bristles from 3½ to 4 inches long and ready for the bristle dresser have been bringing from $3 to $5 a pound, whereas those from 2½ to 3 inches long, equally well prepared, may be expected to bring from $1 to $3 a pound.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Beekeeping—By Everett Franklin Phillips, Professor of Apiculture, Cornell University. The Macmillan Co. $4.00.

Breeding Your Own, or Raising Colts for Pleasure and Profit—By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Farm Accounting—By Donald R. Mitchell, Asst. Prof. Agri. Economics, Univ. of Wisc. McGraw-Hill Book Co., Inc. (1941). $2.50.

Farm Shop Practice—By Mack M. Jones, M.S., Prof. Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. The Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Association. $2.50.

Home Vegetable Gardening—By Charles S. Nissley, Extension Horticulturist in Vegetable Growing. Rutgers Univ. Press (1942). $1.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw-Hill Book Co., Inc. $4.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Poultry Management—By James E. Rice, Emeritus Professor of Poultry Husbandry, and Harold E. Botsford, Extension Professor of Poultry Husbandry, both at New York State College of Agriculture. Fourth Edition (1940), John Wiley & Sons, Inc. $2.75.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

Vegetable Crops—By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. McGraw-Hill Book Co., Inc. $5.00.

BOOK NOTES

Practical Horse Breeding and Training—By Jack Widmer.

In *Practical Horse Breeding and Training*, Mr. Widmer describes in complete detail and with a month by month schedule just how a horse should be handled for the first five years of its life, and how a thoroughly finished mount can be the result. This book will be useful in a breeding establishment of any size, and because of its very simplicity and common sense it can be recommended highly to every horseman who is at all interested in the breeding or training of horses, especially thoroughbreds and hunters. One of the most striking and most valuable features of this new book is the photographic work included.

Publishers: CHARLES SCRIBNER'S SONS. (1942). $3.00.

Booklets of interest published by The Horse and Mule Association of America, Inc., 407 South Dearborn Street, Chicago, Illinois:

1. **Training Riding Horses**—Booklet 264—25c.
2. **Horse and Mule Power in American Agriculture**—Book No. 235—10c. This is a publication which is of definite interest to all who are interested in horses.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

Soil Conservation Bulletins

To Hold This Soil
Miscellaneous Publication No. 321, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 45c

Terracing for Soil and Water Conservation
Farmers' Bulletin No. 1789, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

What is Soil Erosion?
Miscellaneous Publication No. 286, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Strip Cropping for Soil Conservation
Farmers' Bulletin No. 1776, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

The Land in Flood Control
Miscellaneous Publication No. 331, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Conservation Farming Practices and Flood Control
Miscellaneous Publication No. 253, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil-depleting, Soil-conserving and Soil-building Crops
Leaflet No. 165, Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil Conservation Districts for Erosion Control
Miscellaneous Publication No. 293, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Soil Defense in the Northeast
Farmers' Bulletin No. 1810, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Erosion on Roads and Adjacent Lands
Leaflet No. 164, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

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Everybodys Poultry Magazine

With more than 100,000 circulation, concentrated largely in the 14 Northeastern states, **Everybodys Poultry Magazine** today is the leading poultry publication edited and published in the East for Eastern poultry raisers.

Several publications, including the Poultry Fancier which traced back to 1895, were included in the combination of journals succeeded by the establishment of **Everybodys Poultry Magazine** in 1915 at Hanover, Pennsylvania, where it has been published continuously since that time.

Editor is Roland C. Hartman, a former 4-H Poultry Club member in Wisconsin, who is also editor of the **National Poultry Digest**, a pocket-size publication which began in 1939.

Most of the material published in **Everybodys** originates from within the territory which it serves. While good methods employed on commercial farms often furnished the inspiration for "how to do it" stories, these articles are usually presented in such a way that the recommendations and ideas can be adapted by almost any farm flock owner.

One feature which has proved extremely popular is P. S. White's monthly "Diary of a Poultryman," which private surveys have shown to have the highest reader interest rate of any department in a poultry magazine.

During 1942, **Everybodys Poultry Magazine** instituted a valuable service to the poultry industry when it launched a program for conservation of egg cases by producers, egg receivers and handlers, and by the Army. More than 15,000 posters on egg case conservation were distributed to army camps throughout the United States with the result that thousands of cases which would otherwise have been destroyed are now being carefully handled and resold for further use.

The above is printed for the information of our readers, and as a courtesy to the sources of our information.

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